S.M. Oliva

COMPUTER CHRONICLES REVISITED

VOLUME 5

1987

A review of the PBS series that aired from 1983 to 2002.

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Computer Chronicles Revisited, Volume 5

1987

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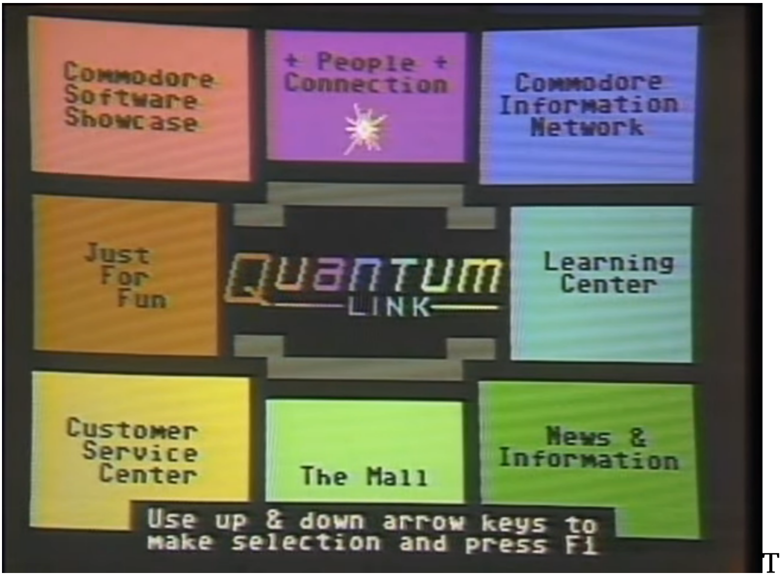
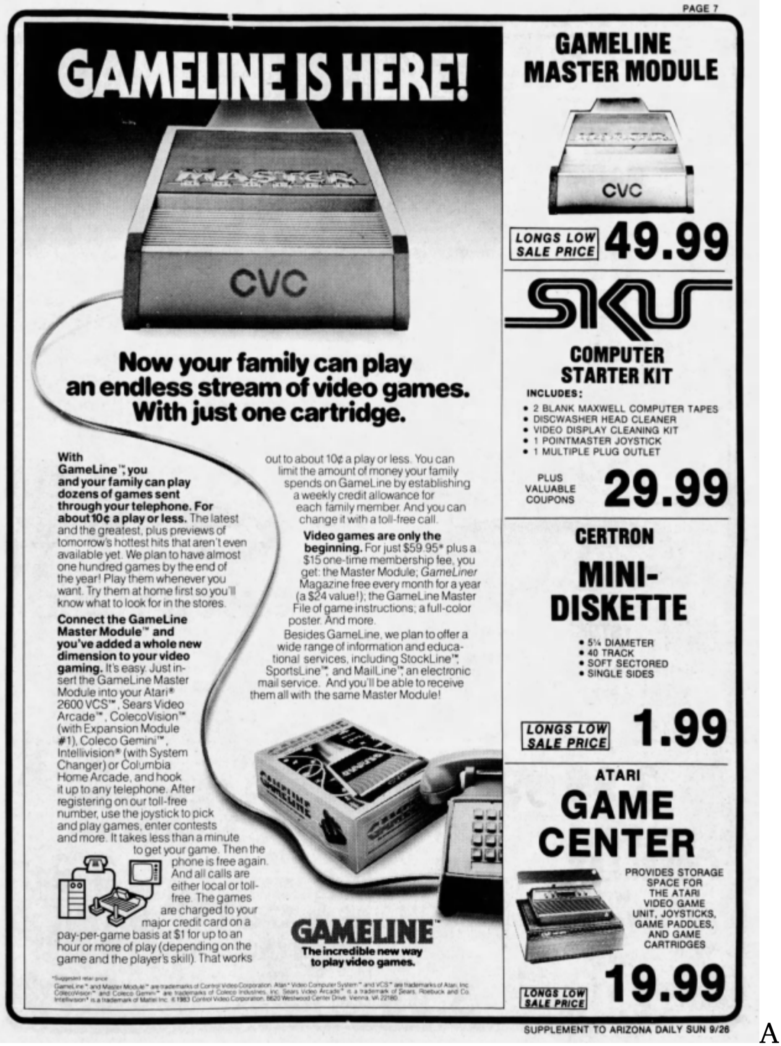
Introduction

This ebook reprints a series of posts from my blog *Computer Chronicles Revisited*, which I launched in May 2021. Each chapter covers a single episode of the PBS series *Computer Chronicles* that aired during the second half of the show's fourth season (spring 1987). There is an extended recap of each episode followed by analysis of what became of the people and products featured on the program. Each chapter concludes with a section called "Notes from the Random Access File," an homage to the news segment that followed most *Computer Chronicles* broadcasts.



Use up & down arrow keys to make selection and press F1

The main menu for “Quantum Link,” an online service for Commodore 64 users that debuted in November 1985. There is a Quantum Link logo in the center of the screen, which is surrounded by eight colored squares in a grid pattern. Each square has a different menu option. Starting from the top left and going clockwise, the options are: Commodore Software Showcase, People Connection, Commodore Information Network, Learning Center, News & Information, The Mall, Customer Service Center, and Just for Fun


CVC
MASTER
CVC
GAMELINE

PAGE 7

GAMELINE IS HERE!

Now your family can play an endless stream of video games. With just one cartridge.

With GameLine™, you and your family can play dozens of games sent through your telephone. For about 10¢ a play or less. The latest and the greatest, plus previews of tomorrow's hottest hits that aren't even available yet. We plan to have almost one hundred games by the end of the year! Play them whenever you want. Try them at home first so you'll know what to look for in the stores.

Connect the GameLine Master Module™ and you've added a whole new dimension to your video gaming. It's easy. Just insert the GameLine Master Module into your Atari® 2600 VCS™, Sears Video Arcade™, ColecoVision™ (with Expansion Module #1), Coleco Gemini™, Intellivision® (with System Changer) or Columbia Home Arcade, and hook it up to any telephone. After registering on our toll-free number, use the joystick to pick and play games, enter contests and more. It takes less than a minute to get your game. Then the phone is free again. And all calls are either local or toll-free. The games are charged to your major credit card on a pay-per-game basis at $1 for up to an hour or more of play (depending on the game and the player's skill). That works out to about 10¢ a play or less. You can limit the amount of money your family spends on GameLine by establishing a weekly credit allowance for each family member. And you can change it with a toll-free call.

Video games are only the beginning. For just $59.95* plus a $15 one-time membership fee, you get: the Master Module; *GameLiner* Magazine free every month for a year (a $24 value!); the GameLine Master File of game instructions; a full-color poster. And more.

Besides GameLine, we plan to offer a wide range of information and educational services, including StockLine™, SportsLine™, and MailLine™, an electronic mail service. And you'll be able to receive them all with the same Master Module!

GAMELINE™
The incredible new way to play video games.

*Suggested retail price
GameLine™ and Master Module™ are trademarks of Control Video Corporation. Atari® Video Computer System™ and VCS™ are trademarks of Atari, Inc. ColecoVision™ and Coleco Gemini™ are trademarks of Coleco Industries, Inc. Sears Video Arcade™ is a trademark of Sears, Roebuck and Co. Intellivision® is a trademark of Mattel Inc. ©1983 Control Video Corporation, 8620 Westwood Center Drive, Vienna, VA 22180.

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SUPPLEMENT TO ARIZONA DAILY SUN 9/26

A full-page advertisement from the September 26, 1983, Arizona Daily Sun newspaper. The headline reads, “GAMELINE IS HERE!” and explains that GameLine allows families to play dozens of games for 10 cents a play or less. The GameLine Master Module itself cost $49.99

Chapter 1: QuantumLink, Dow Jones Information

Services, Delphi, and Minitel

An ad in the October 6, 1985, edition of *The Scrantonian* announced an upcoming meeting of the Scranton (Pennsylvania) Commodore Users Group on October 8 that would feature a demonstration of QuantumLink, a "new computer information network." The people who attended that meeting could not have known this, but they were likely among the very first members of the general public to see what a few years later would morph into America Online, one of the dominant online services of the 1990s.

Steve Case, the man who would become America Online's CEO and go on to lead the company into one of the most disastrous deals in U.S. business history–AOL's 2001 merger with Time Warner–was a guest in this next *Computer Chronicles* episode, the first to be broadcast in 1987. At this point, Case was merely QuantumLink's head of marketing. His service had yet to escape the confines of the Commodore 64. Indeed, QuantumLink was just one of many companies featured in this first of a two-part look at "on-line services."

Stewart Cheifet opened the program by demonstrating one of QuantumLink's features to co-host George Morrow–a casino. There was a slot machine on the screen with fully animated graphics and a chat window to talk to other users. (Cheifet emphasized that no real money was involved.) Cheifet asked Morrow what something like the "casino" told him about this approach to online information. Morrow said the game worked well from a medium that was "warm" to "sometimes hot." Some of the other online services made you think that you were back in the era of talking to a teletype rather than a computer. You had to play your interface to the warmth of the media, and some of the better online services were doing that–and eventually they would all have to do so.

Another Chronicle Goes Online

Wendy Woods presented her first report focusing on the *San*

Francisco Chronicle, which was now available online. Woods said that newspaper publishing was largely an art of “mind over matter”–how to put ideas and events into physical shape as quickly as possible. One of the obstacles to assembling that information has been the printed document itself, i.e., the thousands of pages that flowed out of printing presses every day.

Typically, Woods said, the masses of photos, drawings, and words were carefully clipped and stored in bulging files, where they became historical material. But today, at some major newspapers like the *Chronicle*, paper files were being replaced with online digital storage. Working through an online service called DataTimes, the *Chronicle* was building an electronic library. Each day’s news stories were added to the database within 24 hours.

Woods said the key to the system’s speed was the software, which took the final story as entered into the newsroom’s computers and automatically re-formatted the writer’s editing commands into retrievable library form. After some classifying and editing by the *Chronicle*’s library staff, stories could be recalled by keywords, subject, or other cross-references. If a reporter needed background information, they could scan through the titles of past stories and view the full text of those that were the most relevant.

DataTimes gathered articles from 30 metropolitan newspapers, Woods said, as well as some foreign news services. In the early days of computing, memory storage was precious and costly. But today, the newest form of information storage was taking its place alongside one of the oldest and most valued.

QuantumLink Hoped Graphics Would Make the Difference

Steve Case and Stephen Fickes joined Cheifet and Morrow for the first studio round table. As previously mentioned, Case was vice president of marketing with Quantum Computer Services, which operated QuantumLink. Frickes was an account executive with

CompuServe.

Morrow opened by noting that CompuServe was owned by the tax preparation firm H&R block. (Morrow made this sound like a recent investment, although it took place back in 1980.) He asked Fickes what CompuServe brought to H&R Block. Fickes said that there were three different areas where H&R Block benefited. The first was access to online information. The second was network services, i.e., linking personal computers to host computers run by large corporations. Finally, there was the building of a company's information service that people could remotely access. All three of these areas were growing very quickly.

Cheifet noted that he loved online services, but there were also a lot of complaints from users. What were the biggest complaints that Fickes had heard? What would people like to see done better? Fickes said the main complaint was about time lag when jumping from one service to another within CompuServe. Cheifet said his main complaint was the use of different commands in different parts of the service. Why couldn't that be cleaned up so you only needed to learn one set of commands? Fickes said that tended to be a function of how many different bits of information there were on the service.

Morrow interjected, noting that online services had a lot in common with traditional databases and spreadsheets. So why not get together with a company like Ashton-Tate (which made *dBASE*) or Lotus to develop a more familiar user interface? He added that Lotus was teaming up with one of the services, although he didn't say which one. Fickes said that CompuServe was exploring all those areas.

Cheifet turned to Case and asked him about the feedback he'd received on QuantumLink, which had a more graphical-friendly interface. Case noted that QuantumLink had only launched about a year ago and when they entered the market they saw three problems for consumer users of online service. The first was that they were too expensive. The second was that they were just too difficult to use. And the third was that they weren't fun. So QuantumLink's goal was to develop a service specifically for

Commodore users that was very easy to use. Echoing Cheifet's earlier point, Case emphasized the commands were uniform throughout the entire QuantumLinnk system. The service was inexpensive, useful, and fun.

Cheifet asked Case for a demonstration of QuantumLink. Case showed the service's main menu (see below). He explained there were eight different departments on the service. You used the cursor keys on the Commodore keyboard to move around the options. Cheifet asked about the "People Connection" department. This actually loaded a screen from disk, Case explained, so that the graphics didn't have to be transmitted over the network.

"People Connection" was what Case called the "social center" of the system. Users could meet in rooms like a "lobby," chat with each other, and conduct conferences with special guests such as rock stars and computer programmers. With respect to the user interface, you only had to press one key to pull up a list of commands, and again that was the same across the entire service.

Case then briefly explained how online chat worked, i.e., you typed a message and sent it to everyone who is in a particular room. He added that users could create their own rooms for specific topics like discussing *Computer Chronicles*. Cheifet asked if anyone ever said anything meaningful or useful in these chat rooms? Case reiterated that they hosted a number of specific conferences with a dedicated schedule. QuantumLink even published a program guide much like a *TV Guide*. There were typically 7 or 8 such events each night. But overall, the rooms were a place to meet friends and talk about their interests.

Cheifet said that he'd heard stories that QuantumLink would go beyond Commodore sometime. Was that true? Case said they were looking at it. Right now they were focused heavily on the Commodore market, but he thought QuantumLink's approach would work in other segments of the home computer market as well.

Turning back to Fickes, Cheifet asked if CompusServe was playing around with ideas like what QuantumLink had done with respect to the user interface. Fickes said they were playing around with graphics approaches. But given that CompuServe ran on many different types of computers, they were somewhat limited on what they could do locally. But he said that CompuServe was coming out with a new product oriented for IBM PC users, which would be more effective in accessing services within that environment.

A Day in the Life of a Sysop

Wendy Woods presented her second remote segment, which profiled Don Watkins, a CompuServe systems operator (sysop). Watkins lived in an unincorporated area of Sonoma County, which as Woods noted was far from a “bustling technological center.” But from this location, which appeared to be a farm, Woods said that over 25,000 CompuServe users could receive answers to technical questions about their IBMs and compatible PCs.

Woods said this farm was Watkins’ home and office. Watkins, formerly an information systems manager in the banking industry, was now a sysop for the five IBM special interest–or SIG–areas on CompuServe. (Those areas were New Users, Communications, Hardware, Juniors, and Software.) Watkins supervised conference areas, data libraries, and message bases of CompuServe’s Ohio-based mainframes.

Watkins told Woods that users could get free or low-cost programs, user-supported programs, and they could also access a huge intellectual base of talent and experience of people who had tried and reviewed other products.

Woods said that Watkins had managed the IBM forums on CompuServe for five years. In that time, he’d watched the members change from hackers and hobbyists to mainstream computer users who were just interested in getting a job done. The SIGs had taken on a much broader appeal, and in our information-driven society, such resources could only get more popular. For example, Watkins said that he could talk to someone in New York City or Miami or Dallas about a product that they might know more about than him. And having such a two-way dialogue was quite valuable.

Delphi Promised Cheaper Online Access

Clay Cocalis and Nancy Tully joined Cheifet and Morrow for the next segment. Cocalis was a sales representative with Dow Jones & Company. Tully was senior director for information services at Delphi.

Morrow opened by noting that Dow Jones had long been a leader in financial services. He asked Cocalis if Dow Jones might not exert similar leadership in bringing standards to communications software and online services. Cocalis replied that was a very challenging question. It was not easy to get together with the other companies. Morrow retorted that Dow Jones was big and prestigious enough to press forward and get a standard done. Cocalis said the problem was that there were so many different kinds of computers, Dow Jones would be getting itself into a "nightmare" trying to support each type of equipment (Apple, IBM, etc.), and you would have to make sure the products worked on every machine.

Cheifet asked Cocalis what kind of people subscribed to Dow Jones online service. Cocalis said there were a large number of subscribers. But their best market was their corporate customers, e.g., Fortune 500/1000 companies. Cheifet asked Tully the same question about Delphi. Tully said Delphi's largest growth over the past 18 months had been with the home user. The typical user was someone who had bought a new computer. Delphi was also focused on growth in the small business market.

Morrow asked Tully what Delphi had done to make its user interface better for users. Were they focused on a specific hardware or software package? Tully said no, Delphi cooperated with a lot of the software manufacturers in getting Delphi into their products. But Delphi didn't have its own dedicated software package. She added that Delphi had been judged "easy to use" by a number of product reviewers.

Cheifet asked Cocalis for a demonstration of the Dow Jones service. Cocalis showed a database that contained the last 90 days of news on any publicly traded company, which could be searched by stock or industry symbol. The information was as recent as 90 seconds and updated throughout the business day. For example, he pulled up the last 90 days worth of headlines for IBM. There were nine pages of headlines and a two-letter code next to each headline. The user could retrieve the full text of an article by entering the corresponding two-letter code.

Morrow asked if you could use the service to follow 2 or 3 specific companies. Cocalis said absolutely, there was a tracking service that allowed the user to create up to 5 “profiles” with 25 stocks each. This would let you get the latest stock price and the past two days worth of news.

Morrow clarified that Dow Jones’ interface was standard across all of its services. Cocalis said that was correct. He then continued his demo by pulling up a listing of headlines on the computer industry as a whole. There were 20 pages of headlines. Cheifet asked Cocalis what command he used to do that. Cocalis said he typed `i/edp`. The “i” stood for “industry,” while “edp” stood for “electronic data processing.” Dow Jones categorized every major industry to make it easier for the user to find a specific industry. Cheifet asked if all the codes were listed in a manual. Cocalis said there was a manual as well as a separate online database. Morrow asked how you accessed that database. Cocalis said there was a specific command for “database.”

Cheifet next asked Tully how Delphi was different from the other online services profiled so far. Tully said Delphi was a relatively new service and it differed in that it originated as an online service as opposed to being a byproduct of excess computer capacity. Tully pulled up Delphi’s main menu. She noted the system’s many features, including electronic mail and real-time conferencing.

Morrow asked how many subscribers Delphi had. Tully said that was proprietary information. But she said the subscriber base had been growing at a rate of between 12 and 15 percent a year. Tully then continued her demo. She selected “Groups and Clubs” from the main menu, which she said had been the most popular part of the service over the past 18 months. (Cheifet noted this was basically the equivalent of CompuServe's SIGs.) She selected the Macintosh group by typing `mac`. A welcome message followed listing the manager and sysop for the group, a conference schedule, and new forum messages. Morrow noted the system beeped when she entered the group. Tully said that was an indicator that she had new messages in response to one of her earlier posts. She had posted a question about *Microsoft Excel* and another user (MADMACS) had posted an answer.

Cheifet asked if Delphi was less expensive than some of the other online services. Tully said a lifetime membership was only $49.95. Connection time ranged from 11 cents per minute at night to 29 cents per minute at night from anywhere in the United States. There were no monthly minimums or extra charges for faster (1200 baud) modems.

Was France's Approach to Online Services "Socialist Hap"?

Jack O'Grady joined Cheifet and Morrow for the final segment. O'Grady was the U.S. representative for Intelmatique, a subsidiary of France Telecom. O'Grady demonstrated the Minitel, a small computer terminal used to access an online service run by France Telecom.

Cheifet said the Minitel in the studio was already connected to Paris. He asked O'Grady to show how you could shop for a car using the system's classified service. O'Grady pulled up a menu listing 39 different car brands. He said you could compare different makes and models. He selected a Mercedes 420 SE and a Jaguar Sovereign 3.6. This brought up a graphic display comparing the features of the two cars.

Morrow noted the French government gave the Minitel terminals away for free. Wasn't that just a lot of "socialist hap"? O'Grady said the terminals were actually loaned, in the same manner as AT&T leased telephone handsets. Morrow pressed, Why should people get a terminal for free? O’Grady said it cut down on the paper telephone directories, as anyone who accepted a Minitel had to forgo receiving a traditional phone book. It would also eventually lead to reductions in the number of telephone operators needed to provide information.

How long would it take before the Minitel paid off over paper directories, Morrow asked. O’Grady said France Telecom believed it had already paid off. The original estimates were that it would take five years to pay off, and it had only taken four-and-a-half years.

O’Grady demonstrated another part of the Minitel service, which offered the newspaper *Le Monde* online. This service was updated every two hours. Cheifet asked if people were actually reading the full paper online. O’Grady said absolutely, and that included the full paper, with sections like classified ads and even horoscopes. Morrow asked about financial information. O’Grady said you could search for information from the Bourse stock exchange. Despite his earlier “socialism” remark, Morrow seemed impressed by the system. Cheifet added the Minitel approach really helped to standardize the service.

Winter CES Brought Promises of Laser Printers, 3D Glasses for the Atari ST

Stewart Cheifet delivered this week’s “Random Access,” which was recorded in January 1987.

- Atari was reportedly coming out with a low-cost laser printer during the first quarter of 1987. Cheifet said the rumored $1,500 printer would be similar to the Apple LaserWriter but without an on-board processor or memory. Atari was also expected to bundle this new printer with a $3,000 desktop publishing package that would include a 1040ST with a hard disk.
- At the winter Consumer Electronics Show in Las Vegas, ANTIC Software showed off its new Stereotek glasses, which could turn an Atari ST monitor into a 3D display

using liquid-crystal shutters that opened and closed in sync with the monitor's refresh rate. (The 3D effect was similar to a View-Master.) Cheifet said there was already a software package called *CAD 3-D* that could be used with the glasses.

- The annual Macintosh expo was held in San Francisco. Cheifet said there was a 40 percent increase in exhibitors.
- US Robotics announced a new deal on its 9600-baud modems for BBS operators; they could receive the modem at half-price (around $500) if they posted a notice on their board advertising the product. Cheifet noted that a similar deal two years ago helped push sales of US Robotics' 2400-baud modems.
- Paul Schindler reviewed *The Page* (Orion Microsystems, $22), a DOS utility program.
- A recent study by the federal government concluded that the government was way behind private industry in upgrading computer equipment. Cheifet said the study found that the typical Fortune 500 company kept a computer for less than 5 years, while the typical government office kept a computer for more than 10 years.
- Engineers in Scotland reported a major development in producing "laser" computer chips that used light waves rather than electronics thanks to a layer of coated glass that could either reflect a light beam or allow it to pass through. Cheifet said this could be the key to fast, compact parallel computing.
- Atari founder Nolan Bushnell was now marketing "Techforce" toys. These were robot toys that could be activated by inaudible signals in a television program. This allowed the toys to become interactive participants with the TV show. Cheifet said that the Techforce robots were due out by fall 1987 and "may well become the high-tech toy hit of the next Christmas shopping season."

The Face That Launched a Billion Floppy Disks

The story of QuantumLink actually began with another online service that has been frequently mentioned on *Computer Chronicles*, The Source. As I discussed in a prior post focusing on The Source, that service was founded by William von Meister in 1979, who lost control of the project in a fight with his business partner. Undaunted, von Meister quickly moved onto his next idea–selling music online.

Now, we're not exactly talking about the iTunes store here. Rather, von Meister's proposed "Home Music Store" involved beaming music via satellite to local cable television systems, who in turn would send a digital signal into subscribers' homes, and then those subscribers could then tape record the songs on their own stereos.

Von Meister spent much of 1981 peddling this idea to investors. But it quickly collapsed when Warner Brothers backed out of a deal to license its music catalog to the Home Music Store. A Warner Brothers executive, however, suggested von Meister try his idea out with another technology: video games. Of course, in 1981 Warner Brothers also owned Atari, Inc., then the leader in the home video game console market.

According to Alec Klein's 2003 book, *Stealing Time: Steve Case, Jerry Levin, and the Collapse of AOL Time Warner*, von Meister eagerly embraced this new concept. He "developed a cheap and fast modem–basically, a little box with a lot of electronics stuffed in it." This modem would plug into the Atari 2600 console like a cartridge. With the modem connected to a telephone line, the user could then download games remotely.

Klein said von Meister managed to raise $400,000 in initial funding. He then formally incorporated the business in Virginia as the Control Video Corporation. In January 1983, von Meister held the first public event for his new project at the Tropicana Hotel in Las Vegas. This was during the winter Consumer Electronics Show, but von Meister didn't want to pay for an actual booth. Instead, he hired a group of showgirls to lure potential customers to his suite at the Tropicana. According to Klein, von Meister took 150,000 orders.

It was at this point that Steve Case entered the story. Born in

1958, Stephen McConnell Case graduated from college in 1980. He then managed to convince Procter & Gamble to hire him as an assistant brand manager, where he oversaw a hair-conditioning towelette. That job didn't last long, however, and Case later ended up doing market research for Pizza Hut, "traveling to small pizza shops [and] testing pizza flavors," as Klein put it.

So Steve Case was not what you would call a success. But it turned out that his older brother Dan was, having made his fortune in investment banking and, more importantly, contributing several million dollars in capital to von Meister's new online video game venture. You can probably guess what happened next: Steve Case came to see von Meister's Tropicana "show" in Las Vegas and Dan Case "convinced" von Meister to give his younger brother a job as a part-time marketing consultant at Control Video Corporation.

Although Control Video's new product–dubbed the GameLine–was ostensibly about video games, even in early 1983 von Meister saw it as a means of building a more comprehensive online service. The first ads for GameLine, which started appearing in newspapers in September 1983 (see below), made it explicit that "video games are only the beginning," and promised additional services that Control Video planned to offer, including electronic mail, stock information, and sports scores. Von Meister told the press that same month that about 3,000 subscribers had already purchased the GameLine "master module," which included the modem hardware.

To be clear, customers were actually renting games rather than buying them. A customer purchased the hardware, dubbed the "Master Module," for about $50. They then had to call GameLine to register for the service, which involved a separate fee, and provide their credit card information. Once registered, the user could download games for $1 each, but they could only play it 10 times. Control Video spun this as being able to try a game out before you bought it at the store.

The initial GameLine catalog boasted several dozen games. But they were all from third-party publishers. The two biggest publishers on the Atari 2600 platform–Acitivision and Atari itself–did not participate in GameLine. In December 1983, Atari and Activision announced their own joint venture to produce a similar technology, but I don't think it ever came to fruition.

Indeed, Control Video's timing for GameLine could not have been worse. By late 1983 the home video game market was in the midst of a full-scale collapse, largely brought about by the excessive amount of Atari 2600 games in retail distribution. In December 1983 you could probably just buy one or more games for $1 at a store desperate to clear inventory. And retailers probably weren't eager to keep a product on shelves that might only further cut into those sales. Ultimately, Klein said that while Control Video shipped 40,000 Master Modules to retailers, 37,000 of them came back and were thrown in a dumpster behind the Control Video offices.

Altogether, Control Video spent $20 million on GameLine and only managed $40,000 in revenue–and $15,000 of that figure came from selling rides on a hot air balloon that von Meister bought for the launch event at the Tropicana. One of von Meister's infuriated investors decided to bring in an old Army buddy, Jim Kimsey, to serve as a "consultant" to von Meister. Kimsey had no background in technology, but he owned a number of successful bars and restaurants in the Washington, DC, area near Control Video's Virginia headquarters.

Kimsey only intended to stay a short time before returning to his own businesses. But an early 1984 meeting in Palo Alto, California, with investors and the board of directors quickly turned into a coup, ousting von Meister as CEO and replacing him with Kimsey, who brought in Marc Seriff, an engineer with a decade of experience in telecommunications, to run the technical side of the business.

Kimsey also promoted marketing consultant Case to vice president of marketing in 1985. According to Klein, this was less about Case's raw talent or accomplishments than the fact that he was young and cheap (and Kimsey had fired everyone else above Case on the organizational chart). Kimsey also knew that keeping the younger Case around would help convince his brother to keep pouring money into the struggling company.

This was also the period when Control Video renamed itself Quantum Computer Corporation. The name change became official in May 1985. By this point the company was down to just 10 employees, including Case. GameLine was long dead and Kimsey's initial plan was to quickly sell what was left of the company. He approached Apple, but Klein said the executives there "practically rolled on the floor" with laughter at the suggestion.

Kimsey found a more willing partner, however, in Commodore International. Commodore didn't buy Quantum but rather agreed to provide "extensive marketing support" for a new online service that Quantum would run. This was announced in July 1985. From Commodore's perspective, they saw it as a way to extend the life of its flagship Commodore 64 home computer.

As part of this new arrangement, Commodore introduced Kimsey and his team to PlayNet, a small software company based in upstate New York. Founded in 1982 by former General Electric engineers Howard Goldberg and David Panzi, PlayNet was another early online service that stressed games and social activities as opposed to business uses. Kimsey licensed PlayNet's software for $50,000 to use with his company's news Commodore online service, which was named QuantumLink.

QuantumLink formally launched in November 1985. Early adoption was slow. Despite a huge marketing push from Commodore and millions of C64 machines in households, there were only 10,000 QuantumLink subscribers by January 1986. It was still promising enough to help Kimsey attract additional investors for the company, and by the time this *Chronicles* episode taped in December 1986, QuantumLink had around 50,000 subscribers.

As QuantumLink rose, so did Case. Kimsey promoted Case to executive vice president in 1987, effectively designating him as the heir apparent. Case's rise to the top was almost derailed, however, by of all things Apple. In May 1988, Apple announced its own online service for Macintosh users called ConsumerLink–

later dubbed AppleLink Personal Edition–which Quantum Computer Services would run. But the deal ran into trouble. According to Alec Klein, "Apple had been difficult to deal with from the beginning, demanding that Quantum adhere strictly to Apple's look and feel in the design of [AppleLink Personal Edition]." Apple was also refusing to pay the millions of dollars it owed to Quantum for its work. Klein said that Quantum board members wanted to fire Case, as he'd been in charge of the deal, but Kimsey saved his protege's job.

Quantum ended up bringing the AppleLink Personal Edition to market on its own without Apple's support. In late 1988, Quantum and Tandy Corporation also launched PC-Link, a QuantumLink-type service focused on Tandy's line of IBM PC compatibles. By early 1989, Quantum was also working on a user interface for "California Online," a proposed online service that would have been run by Pacific Bell.

When Pacific Bell decided to abandon California Online in October 1989, Case took some of the concepts developed for that project and merged it into AppleLink Personal Edition, which was relaunched as America Online on October 2, 1989. (Klein said Case came up with the AOL name himself.)

I won't delve deeply into the rest of AOL's history at this time. In brief, Case became president and CEO of the company in 1991, the same year it was officially renamed from Quantum Computer Services to America Online Inc. Kimsey, who remained chairman of the board, briefly reclaimed the CEO's title to reassure investors when America Online went public in March 1992. After the initial offering raised $66 million, Case was reinstated as CEO. Case also became chairman upon Kimsey's retirement in 1995. In 2001, Case led America Online into the infamous merger with Time Warner. Case became executive chairman of the combined company but resigned in 2003, the same year that Klein published his book. Case left the AOL Time Warner board altogether in 2005 and started the venture capital firm Revolution LLC, which he still runs today.

Notes from the Random Access File

- This episode is available at the Internet Archive and has an original broadcast date of January 8, 1987.
- Stephen Frickes remained with CompuServe until 1998, rising to become director of international sales. He later held sales director positions with UUNET, MCI Corporation, and Verizon. His most recent position was as senior director of business development with Flex, a multinational manufacturing company.
- Don Watkins also remained with CompuServe until the mid-1990s, moving over to the Microsoft Network (MSN) in 1997, just a week after Steve Case's America Online purchased CompuServe from H&R Block.
- Clay Cocalis is currently the chief revenue officer at Exterro, a legal software platform company. After leaving Dow Jones in 1999 he served as a senior executive with a number of companies, including Tower Group, Epiq, and Morae Global. He joined Exterro in August 2021.
- The DataTimes service featured in Wendy Woods' first report originated in Oklahoma. Datatek Corporation was founded in October 1981. It originally sold an internal database to *The Oklahoman and Times* newspaper for use by its editors and reporters. A public version of the database–DataTimes–went online in May 1983. In December 1983, the parent company of *The Oklahoman and Times* acquired Datatek as a subsidiary, which was renamed DataTimes Corporation, and started signing up other newspapers like the *San Francisco Chronicle*. Bell & Howell acquired DataTimes Corporation in August 1996.
- Delphi's origins can be traced back to the Northeast Computer Show held in Boston in October 1981. One of the exhibitors was "The Kussmaul Encyclopedia," which was actually an Apple II or TRS-80 computer bundled with a 300-baud modem that could be used to dial an online database containing the actual encyclopedia. Wes Kussmaul, the man behind the encyclopedia, quickly decided to drop the hardware and software bundle and instead focus on building the online database. The company he founded, General Videotex Corporation, launched the Delphi online service in March 1983. Delphi never grew to the same degree as AOL or CompuServe,

however, with around 100,000 subscribers at its peak. In September 1993, Rupert Murdoch's News Corporation purchased General Videotex for $15 million and renamed the company Delphi Internet Services. But two years later, Delphi was down to around 50,000 subscribers and in 1996, New Corporation sold Delphi to a group led by the company's former CEO, Dan Bruns, for "relatively little cash," according to *Fortune*. Bruns decided to reinvent Delphi as Delphi Forums, an advertising-supported web portal. Delphi Forums subsequently went through several more ownership changes before Bruns reacquired the company in 2011. Delphi Forums remains in business today.

- The Minitel enjoyed a long run in France, rolling out nationwide in 1982 and continuing to run until 2012. According to *Forbes*, by 1997 there were 6.1 million Minitel units in France and an additional 600,000 users accessing the service through PC emulation software. But a 1989 joint venture between France Telecom and US West to market the system in the United States ended after just four years. *Forbes* noted that unlike the French government, US West wasn't prepared to subsidize the cost of providing terminals, so American users were expected to pay $15 per month for both the terminals and the service. And by the late 1980s, the Minitel was considered obsolete compared to PCs. Intelmatique continued marketing Minitel in the United States well into the late 1990s, but *Forbes* said there were never more than a few thousand subscribers.
- Atari Corporation did eventually release that laser printer. Known as the SLM804, it made its first public appearance an Atari trade show in London in April 1987, although the demo unit didn't work, according to *NewsBytes*. Contemporary news sources reported that the printers didn't start shipping until sometime in the spring of 1988, by which time the price was $2,000, or $500 higher than Stewart Cheifet's initial report suggested.
- Nolan Bushnell's "TechForce" robots proved to be a dud. Wendy Woods first reported on the project for *NewsBytes*, where she said Bushnell had obtained approval from the

FCC for local television stations to transmit an “inaudible broadcast signal” to the toy robots during the airing of an accompanying “TechForce” cartoon. DIC Entertainment–probably best known in the United States at that time for producing *Inspector Gadget*–was commissioned to produce the cartoon. The project almost immediately faced public opposition. In February 1987, a group called Action for Children’s Television filed a protest with the FCC, arguing that Bushnell’s scheme went too far in blurring the line between programming and advertising, and would create a “second class of viewers” whose parents could not afford the $250 toys. Bushnell dismissed the concerns, but in August 1987, the television show was abandoned because, according to *NewsBytes*, there were “almost no television stations lined up to take it.” (DIC also said there was a “dispute over money and contracts.”) Bushnell’s company, Axlon, Inc., still apparently sold the robots–without the cartoon-enhanced features–but ended up writing off a $325,000 loss on the whole endeavor.

Chapter 2: BIX, NEXIS, EasyNet, and Macworld Expo 1987

The second part of *Computer Chronicles*' two-part look at online services to open 1987 has a strong sense of *deja vu*. That's because there's a repeat guest, Roger Summit, who previously appeared in a 1984 program to discuss Dialog, which is also why he appeared in this episode. Dialog was one of the earliest online database services. And while the previous show focused more on the nascent market for commercial online services like CompuServe and QuantumLink, here the emphasis was more on what Stewart Cheifet described as "high-end databases."

On that note, Cheifet opened by showing this week's co-host, George Morrow, two print editions of the *Directory of Online Databases*. The first was a thin book published about seven years earlier (c. 1979-1980). The second was published in early 1986 and was much thicker. And, Cheifet added, by the time the 1986 edition was out the publishers had to print a supplement because new services had already come online. (Morrow quipped they should have put the *Directory* online.)

Cheifet observed that the growing size of the *Directory* seemed to suggest the market for these databases was growing very quickly, yet fewer than 40 percent of PC owners owned a modem and only about 5 percent actually used online services. Why? Morrow said the modem part was easy–everything was now basically Hayes-compatible–but it was still difficult to master the communications software and the interfaces for the online services. Using himself as an example, Morrow said he tried to obtain an Apple stock quote one evening using an unspecified online service (I'm guessing CompuServe) but never accomplished the task.

Lotus Offered “One Source” for Offline and Online Stock Information

Wendy Woods presented a report that focused on Lotus Development Corporation’s *One Source,* a new service that combined online information with CD-ROM storage. Woods said that when the CD-ROM was first introduced, it appeared to be a technology searching for an application. But today, the 500 MB compact disc was starting to get serious attention.

Woods said Lotus was now testing *One Source* to function within its existing *Lotus 1-2-3* spreadsheet. *One Source* included a CD-ROM containing over 20 years of financial information on over 6,000 companies. The disc was combined with PC-based analytical software and an FM radio receiver for real-time stock quotes.

Steven Singleton, a sales executive with Lotus, explained that you could use *One Source* to monitor your portfolio on a daily basis. The user loaded their stock portfolio into a *1-2-3* spreadsheet. The software would then pull down information on the shares outstanding and the price from the purchase date specified by the user and calculated how many shares they would have bought on a market-valuation basis. *One Source* could then calculate the value of the entire portfolio for the specified date.

Woods said that for a yearly subscription fee of $11,000 to $27,000, an updated CD-ROM was delivered weekly. Compared to using a modem the speed of the CD-ROM was dazzling–the equivalent of 110,000 bits per second. It took about 6 seconds to retrieve 8,000 items on a single company.

While computers had not succeeded in penetrating every office, Woods said, some businesses seemed to be more receptive than others. And Lotus hoped that their new offline/online service would win new converts in the financial world.

A Living, Growing Database on Micros

Connie Tomal and Doug Webster joined Cheifet and Morrow for the first studio segment. Tomal was the west coast branch manager for Mead Data Central. Doug Webster was director of business and marketing with the Byte Information Exchange (BIX). (*Byte* magazine was also a presenting sponsor of *Computer Chronicles* this season.)

Morrow opened by describing *Byte* magazine, BIX's parent, as the *Scientific American* of the computer industry. How did they get into BIX? Webster said that Philip Lemmons, the editor in chief of *Byte*, had seen online conferencing grow as a technology, so he "put two and two together" and realized that his magazine's readership–effectively a living database of knowledge about microcomputers–could use that same technology to exchange information with one another. The magazine could also use online conferencing to get information to its readers and vice versa. Morrow observed that BIX was essentially a "living, growing database on micros." Webster agreed with that description, noting that BIX started operation in November 1985 and was now approaching 12,000 users.

Cheifet asked Webster for a demonstration of BIX. Webster said that "conferences" were the heart of the system. There were about 140 conferences currently on BIX. They were broken down into a broad series of about a dozen groups, such as computers, programming languages, and operating systems. A user could therefore select the specific conferences that were of interest to them. For example, if you typed `show group computers`, a list of conferences within that group appeared on the screen, covering every major platform from Amiga to Zenith. A user could then join a specific conference, say the one on IBM PCs, by typing `j ibm.pc`.

Morrow asked if you had to actually be online to be part of a conference, or could you come and go. Webster said you needed to join the conference once and then you remained a member until you chose to resign. The system kept track of the conferences each member belonged to. Each conference also had a listing of topics under discussion, such as software and hardware.

Cheifet asked what it meant to be a member of a conference. What did that get you? Webster reiterated there were about 12,000 users on the system. Some of them were interested in the IBM PC. Those people were now linked together in that conference and could exchange information with each other.

As an illustration, Webster joined the "hardware" topic within the IBM PC conference. BIX kept track of what the user read and hadn't read. In this case, the system showed Webster that he had 47 unread messages within the hardware topic. The system presented the first unread message (#1886), which contained a header providing information such as the sender and the date. You could also read messages by thread, so you could just look at the replies to a particular message without going through all 47 unread messages.

Morrow asked if a user who belonged to a conference could access messages that were posted before they joined. Webster said yes, users could access any messages that were posted since the BIX service began operating in November 1985. Cheifet asked if BIX offered live or real-time conferences. Webster said not yet, but they were looking into it.

Cheifet asked if there were any plans to expand BIX beyond a conference-based system. Webster said there were presently other online services provided. For instance, a number of companies, including Borland and Microsoft, were using BIX to provide online technical support for their products. Users could also download software and access electronic mail. BIX was also looking into research and online advertising.

Cheifet then turned to Tomal and asked about the NEXIS database. Tomal said NEXIS was Mead Data Central's general news and business information service. It contained 145 files that could be searched all at one time by the type of information. For her demonstration (on a Macintosh), she asked NEXIS to look into its "Business" file, which contained publications such as *Forbes*, *Fortune*, *BusinessWeek*, *The New York Times*, and *The Los Angeles Times*. (She added the newspapers were updated every 24 hours.)

Tomal then queried NEXIS to search for stories related to the recent merger of Delta Air Lines and Western Airlines and the implications for possible employee layoffs. Specifically, she asked for any articles where the terms “Delta” and “Western” appeared within 15 or fewer words of each other and within a few words of the terms “merge” or “takeover.”

Morrow asked what sort of people would be doing these sorts of searches. Tomal said primarily people in a research capacity, such as someone doing background for the news media or persons interested in the story from the labor perspective, such as union officials or lawyers.

NEXIS completed Tomal’s requested search and returned three stories. Tomal explained you could then select an option using the Macintosh’s menus to decide how you wanted to view those results. For instance, selecting “Quick” displayed an excerpt of the full text of the first story with the keywords highlighted. You could then click a button to move to the next result.

Cheifet asked what other information sources were available using NEXIS. Tomal said the database also contained government documents and technical information such as material data safety sheets for handling toxic materials. Morrow clarified that these were full-text materials. Tomal said they were.

Morrow asked how difficult it was to learn the query language to conduct NEXIS searches. Tomal said it was quite easy. Users had to take a basic training class that lasted between 90 minutes and 2 hours.

Making It Easy to Search Online Databases

Roger Summit and Dick Kollin joined Cheifet and Morrow for the final segment. As previously mentioned, Summit was the president of Dialog Information Services. Kollin was president of Telebase Systems, which produced the online service EasyNet.

Morrow opened by asking Summit to explain how a publication–

say, *Ladies Home Journal*–would become part of Dialog's database. Assuming there was an audience for that, Summit said they would license the database from the publisher and pay royalties based on usage. Morrow followed up, asking about the actual process of converting the physical magazines into digital form. Summit said that Dialog would receive it on magnetic tape from the producer. Dialog then re-indexed the material to make it work under Dialog's system.

Morrow asked how long that process took. Summit said once a contract was signed, Dialog could get a database up as early as 2 to 3 weeks. But it could take up to six months depending on the state of the database.

Cheifet asked for a demonstration of Dialog's databases. Summit explained that Dialog was the world's largest online database–covering virtually every subject imaginable–so it was a little difficult to describe in a categorical sense. There were databases in science, technology, medicine, education, and business, among other things. Morrow quipped that Dialog was the "AT&T of Information."

For his demonstration, Summit mentioned he'd recently been having an argument with an attorney on the utility of strict product liability laws. (The attorney was for them and Summit against.) Summit said he pulled some articles out of Dialog to help him make his case. To do that, Summit went into an "Insurance Abstracts" database on Dialog and put in "product liability" and "strict" as parameters. This returned 38 items. The first item was a journal article summarizing recent court decisions involving product liability. A second item looked at punitive damage awards in product liability cases.

Cheifet asked where these articles came from. Summit said that second item came from *The Forum*, a trade journal for the insurance industry. He explained that Dialog covered over 10,000 journals and magazines. Morrow asked if the journal or magazine received a royalty payment each time an article was accessed. Summit said yes, the royalty was based on usage.

Summit then changed databases within Dialog to one focused on engineering texts. He then ran the same search for “product liability” and “strict.” He pulled up a list of titles for the first five search results.

Cheifet asked about CD-ROMs. Would they play a role in a database service like Dialog? Summit said you could take small, specialized databases and put them on CD-ROM. Dialog just did that with the ERIC database. But what they did there was to integrate the CD-ROM with the online service, so a user could search offline on CD-ROM, press a button, and then receive updated and search-related information online.

Cheifet then turned to Kollin and asked him to describe EasyNet. Kollin said EasyNet was a “gateway” also known as IQuest on CompuServe and InfoMaster on Western Union’s online service. Basically, EasyNet was a “smart gateway.” that helped you find the database you were looking for to search. EasyNet connected to 820 databases altogether.

In response to a question from Morrow, Kollin went on to explain that EasyNet attempted to standardize the database input. It allowed the user to go into the service without training. Kollin then provided a demonstration using IQuest. The main menu allowed the user to select a database or have the system choose one for them. If the user opted to have IQuest choose the database, a series of menus “interviewed” the user to help them narrow down the options. For example, you could look at databases by subject matter, such as “law, trademarks, and patents.” Kollin said the results might not be as thorough as other online databases, but the home user could still get respectable results, and the system worked without any formal training. He added that people who used more complex databases often told him they forgot their training because they only needed to do a search about 4 to 6 times per year.

Morrow asked if there was a way for a “power user” to use EasyNet without all the menu-driven hand holding. Kollin said yes, reiterating there was an option on the main menu for the user to select their own database. This option made many more tools available for field searching. Cheifet clarified that EasyNet offered full-text articles. Kollin said yes, adding that if the full text was not available for a particular article, a user could press one button and automatically order it through a third-party information broker.

Macworld 1987 Featured Introduction of Adobe Illustrator, “Big Picture” 17-Inch Display

Stewart Cheifet presented this week’s “Random Access,” which was dedicated to coverage of the Macworld Expo 1987, which took place from January 8 to 10, 1987, in San Francisco.

- Cheifet said this was the biggest Macworld show ever, with more than 250 exhibitors, although Apple itself did not announce any new products. Apple’s vice president for product development, Jean Louis Gassee, said the company’s focus in 1987 would not be on new products but rather “better products.”
- Cheifet said most of the attention at Macworld was on desktop publishing applications, with several new applications introduced, including *Adobe PageMaker 2.0*, which offered some 20 new features, including compatibility with *PageMaker* 1.0 and MS-DOS word processor documents.
- Adobe introduced *Illustrator*, which allowed users to create sophisticated graphics made up of curves and lines rather than dots. Cheifet said users could also scan in an image and build a final drawing from that scanned picture.
- Target Software released *Scoop*, a page composition program that lets users simultaneously build graphics and text on the same page at the same time. You could also wrap text around irregularly shaped graphics. Cheifet said *Scoop* was due out on May 1, 1987.
- A Canadian company introduced *Set and Send*, software that automatically inserts typesetting codes and commands in a document and then sent the completed file directly to a typesetting machine.
- E-Machines of Oregon introduced “The Big Picture” monitor, which let you look at a complete page from

PageMaker or even reduce the size and look at two adjacent pages and still be able to read the text. Cheifet noted the 17-inch Big Picture's display was more than 4 times the size of the Macintosh screen.

- Systems Research showed off an amber display for the Macintosh.
- Two companies introduced "flat" or "laptop portable" Macs. The first was the DynaMac, which had an electroluminescent, full-size display, and featured an optional hard drive and modem. The second was Colby Systems, which showed off the "Lap Mac," which had a gas plasma display, a removable keyboard, and a removable hard disk. Both machines weighed about 15 pounds and would retail for around $5,000.
- A new $125 word processor, *MindWrite*, featured an integrated outliner and the ability to move text using the mouse without having to cut-and-paste. Cheifet said *MindWrite* could also "window" text so you could compare different parts of a document on the same screen at the same time.
- One vendor at Macworld introduced *MacPlaymate*, which Cheifet said allowed you to "integrate some rather interesting graphics into your otherwise dull documents."

BIX Died a Quiet Death Under Delphi

Byte magazine first discussed what would become BIX in its October 1984 issue. The previous September, *Byte* began what amounted to a test run, creating an online conference of 200 participants, which included 100 magazine subscribers chosen by lottery. About eight months later, in the June 1985 issue, *Byte* editor in chief Phil Lemmons formally announced the launch of BIX.

Byte subscribers who signed up for BIX before January 1, 1986, paid a sign-up fee of $25. (Everyone else paid $35.) Connection charges ranged between $6 and $14 per hour depending on the speed of the user's modem and the time of day. BIX initially provided direct telephone access to users in four cities: San Francisco, Los Angeles, Chicago, and Boston. People in other cities could access BIX through McDonnell Douglas' Tymnet for additional connection fees.

In April 1987, Doug Webster told Wendy Woods' *NewsBytes* that BIX had about 14,000 total subscribers, which was actually more than the system could handle. Webster said that BIX stopped accepting new members for a time while it solicited bids for additional hardware to build out the network's capacity.

By late 1988, BIX had worked out its network issues and announced a new "user-friendly front-end system" to rival its much larger competitors, CompuServe and The Source. BIX also launched its own bulletin board service (BBS) and weekly print newsletter. These were both premium products, with the BBS charging $199 a year and an annual newsletter subscription costing an additional $495.

But as The Source collapsed and QuantumLink/America Online started to overtake and eventually acquire CompuServe, *Byte*'s owner, McGraw-Hill, decided in the early 1990s that it wanted out of the online services market. The publisher sold BIX to General Videotex Corporation, the parent company of Delphi, in February 1992 for an undisclosed amount. And as I discussed in the last post, just a year later News Corporation bought General Videotex, only to sell it to Delphi's former CEO in 1996.

Delphi kept BIX running even after reclaiming its independence from Rupert Murdoch, but the service appears to have died a slow death during the latter half of the 1990s. Delphi stopped accepting new BIX subscribers sometime around 1998. And according to a September 2000 Usenet post, Delphi ceased supporting BIX altogether as of November 1, 2000. Other news reports said BIX shut down for good in June 2001.

Small Dayton Paper Mill Eventually Led to Creation of LexisNexis

In 1955, William F. Gorog and Lysle D. Cahill founded Data Corporation in Dayton, Ohio, to develop reconnaissance and intelligence systems. By 1968, Data Corporation's business expanded into a number of other areas, including the creation of a "computer law research system" for the Ohio Bar Association and a magnetic tape reader designed to work with IBM's System/360 mainframe computers, according to a June 1968 article in *The Oshkosh Northwestern.*

That same year another Dayton-based company, The Mead Corporation, purchased Data Corporation in a $6 million stock transaction. Mead Corporation traced its roots back to 1846, when a group of partners led by Daniel Mead started Ellis, Chafflin & Company, which initially owned one of the earliest machine-based paper mills located in Dayton. Mead eventually bought out his partners, reorganized the business as the Mead Paper Company in 1882, and purchased a second paper mill in nearby Chillicothe, Ohio, in 1890.

Mead died in 1891. His sons initially took over the business but nearly ran it into the ground. By 1905, the original Dayton mill had closed and the banks that held Mead Paper Company's loans named Mead's grandson, George H. Mead, as the new general manager. He reorganized the Chillicothe mill under the name of Mead Pulp and Paper Company and managed to take the business public in 1906.

After a series of mergers and acquisitions, George Mead became president of what was now called the Mead Corporation in 1930. He continued to run the company until his retirement in 1948. Mead's successors, Howard E. Whitaker and James W. McSwiney, decided to pursue conglomeration during the 1960s, acquiring a bunch of businesses unrelated to paper-making, including Data Corporation.

Mead was initially interested in Data Corporation–renamed Mead Data Central in 1970–for its work in developing color ink-jet printing technology. In 1972, *Industrial Research* magazine named what Mead called its "Digital Graphics Generator" one of the 100 most significant new technical products of the year. But it turned out that Data Corporation's work developing that computer law research system proved to be far more valuable. In 1973, Mead Data Central launched LEXIS, a national online legal database with full-text search. The service initially lost money but became profitable by the late 1970s.

In 1980, Mead launched the NEXIS news database service demonstrated in this episode. Mead Data Central continued to grow throughout the 1980s and early 1990s on the back of its combined LEXIS/NEXIS service. By 1993, the *Dayton Daily News* reported that LEXIS/NEXIS included more than 322 billion documents and the databases' annual sales exceeded $550 million.

This culminated in Reed Elsevier acquiring Mead Data Corporation–by this point more commonly known as Lexis/Nexis–for $1.5 billion in December 1994. Now known as RELX, the former Reed Elsevier continues to own and operate LexisNexis today as a subsidiary. The NEXIS part of the service currently has over 36,000 licensed resources in its database.

The Mead Corporation itself used the proceeds from the LexisNexis sale to pay down debt and repurchase stock. The company returned to focusing on paper products in the 1990s and merged with Westvaco to form MeadWestvaco in 2002. In 2015, MeadWestvaco merged with RockTenn to form WestRock.

Notes from the Random Access File

- This episode is available at the Internet Archive and has an original broadcast date of January 15, 1987.
- Dick Kollin died in November 2010. Born in 1935 to Hungarian immigrants, Kollin developed Pandex, the first nongovernmental commercial database, in 1971. That same year Kollin licensed Pandex, which contained about 1,200 serials focused on general science, to Roger Summit's Dialog. Kollin co-founded Telebase in 1984 and remained with the company until the early 1990s.
- Telebase continued publishing EasyNet and other online reference services well into the early Internet era. WinStar Communications acquired Telebase in November 1997. Four years later, WinStar filed for bankruptcy and its assets were subsequently liquidated.
- Steven Singleton remained with Lotus until 1991. He spent

most of the 1990s working as a youth sports coach in Oakland before rejoining the financial services industry in the early 2000s. Since 2020 he has been a senior vice president at Raymond James Investment Management.

- Lotus continued to expand its One Source product line to include a variety of CD-ROM database products. In September 1993, Lotus spun the division off into a separate company known as OneSource Information Services, Inc. OneSource's managers and employees at the time took majority ownership in conjunction with two venture capital firms, with Lotus retaining a minority interest. Infogroup later acquired OneSource and continued to operate it as a subsidiary. Infogroup sold OneSource two private equity firms in 2012, which changed the company's name to Avention, Inc. Avention was then sold to Dun & Bradstreet in January 2017 for $150 million.
- Doug Webster began his career as a radio and television announcer in the late 1960s for WTIC in Hartford, Connecticut. He later served as director of news and public affairs for Connecticut Public Television and a special assistant to U.S. Senator Abraham Ribicoff. After stints with the University of Connecticut and a public relations firm, Webster joined *Byte* Magazine in 1984 as its director of public relations, where he remained until 1988. In 1995, Webster moved to California and started his own public relations firm. Webster joined the California Maritime Academy in 2006 as its director of public relations, a post he held until at least the early 2010s.
- Surprisingly, the Dynamac was authorized by Apple. The portable machines were not clones, but rather factory Macintosh Plus computers that were "unboxed and disassembled, with Apple's permission and under quality-control guidelines prescribed by Apple," according to Peter H. Lewis of the *New York Times*. Dynamac then rebuilt the machine "from the logic board up," and stripped it of any Apple branding. The machines didn't sell well and Dynamac went out of business in late 1988.
- The E-Machines "Big Picture" monitor was not made by the South Korean venture eMachines that became famous in the late 1990s for its bargain PCs. This E-Machines was

an Oregon-based company that later changed its name to E-M Technology, Inc., before dissolving in 1997.

- Stewart Cheifet tried to be discreet, but *MacPlaymate* was what Pat Morrison of the *Los Angeles Times* later described as a “sexually explicit computer game” where the player could strip a character named Maxie “garment by garment” and “force her to engage in a variety of sex acts, some with another woman or with any of six devices from a ‘toy box.’” Unlike the Dynamac, Apple did not condone *MacPlaymate*. Neither did Playboy, which later sued the program’s publisher for trademark infringement and obtained an out-of-court settlement.

Chapter 3: The Kowloon Hotel, Exchange Square, CitiCorp Center, and the HSBC Main Building

On December 19, 1984, Prime Minister Margaret Thatcher of the United Kingdom signed a “joint declaration” with her counterpart from the People’s Republic of China, Zhai Siyang, formalizing the return of the British colony of Hong Kong to China on July 1, 1997.

The United Kingdom first claimed the island of Hong Kong as a colony in 1842 after imposing a treaty on China’s Qing dynasty following a conflict known as the First Opium War. After a subsequent conflict–the Second Opium War–the British forced China to cede adjacent territory on the Kowloon peninsula in 1860. In 1898, the British demanded even more land for their expanding colony, which led to a 99-year lease agreement for what became known as the “New Territories.” Although this lease technically applied only to the New Territories, the 1984 joint declaration provided for the return of the entire colony, which only made practical sense since by the 1980s most of Hong Kong’s population resided in that area.

The joint declaration came at a critical time for Hong Kong’s commercial property owners. During nearly a century of British colonial rule, Hong Kong became a major center of commerce in Asia. But in mid-1982, the colony’s real estate market collapsed. According to a February 1984 *Los Angeles Times* report, the values of many Hong Kong properties dropped by “a third or more.”

Hongkong Land, the colony’s biggest commercial landlord, was hit especially hard. The *Times* noted that just before the market collapsed, Hongkong Land had paid $732 million to purchase an old bus terminal. The company planned to redevelop the property as a new headquarters for the Hong Kong Stock Exchange, to be known as Exchange Square. The $1 billion project was projected to pay for itself in 8.5 years following its estimated 1986 completion. But the *Times* said that with rents in Hong Kong now less than half of what they were before 1982–and only one tenant aside from the Stock Exchange signed up to lease space–it might take 15 years or more to recoup the construction costs.

Lest you worry that a company built on British colonialism would somehow fail, Exchange Square opened on April 1, 1986. By that time Hong Kong's economy had rebounded, in no small part because the joint declaration had reassured foreign investors that there would no longer be any political uncertainty surrounding the colony's future. Hongkong Land did quite well on Exchange Square and continued to build its portfolio, and even today is still the largest landlord in the now-Chinese Special Administrative Region of Hong Kong.

Would Intelligent Buildings Make Prisoners Of Their Occupants?

If you're wondering what any of this has to do with *Computer Chronicles*, well it's because Exchange Square was one of the featured "guests" in this next episode from January 1987. Stewart Cheifet and company were not interested in the economic and political history of Exchange Square so much as the computers inside the finished complex. Exchange Square was among the first of a new wave of "smart office buildings," which promised tenants a full range of computer-based automation services.

Most of this episode consisted of remote reports from Hong Kong. Stewart Cheifet and George Morrow taped a brief introductory segment in the San Mateo studio. Cheifet showed Morrow an Apple II program called *Power House* that allowed a home user to control the electrical and electronic appliances throughout their house. The main menu consisted of icons representing the various rooms in the house. Cheifet showed how you could zoom in on a particular room–at best could be represented by Apple II graphics–and see the specific appliances connected. This effectively turned your home into an "intelligent home," he noted.

Cheifet said the subject of this episode was "intelligent buildings," specifically commercial buildings. What did Morrow think about this concept? Morrow said installing computers in buildings would become absolutely essential when it came to controlling communications. But when it came to controlling the building itself–the lights, the elevators, the doors, et al.–he saw the risk of computers making prisoners of the people trying to run the business. So it would be a rocky road unless there was a lot of flexibility built into the computer systems.

The Kowloon Hotel

Cheifet narrated the first remote segment, which focused on the Kowloon Hotel, an "intelligent hotel." (Throughout this segment, there is B-roll footage of *Computer Chronicles* producer Sara O'Brien in the hotel.) Messages at the Kowloon were transmitted by a local area network (LAN) directly into television monitors in each room. Guests could retrieve their messages at any time by pressing a key on the telecenter's main control panel. Messages were entered into the main system as they were received, either at the front desk or the communications center.

Ronald Suen, an assistant group controller with the Kowloon Hotel, told Cheifet that the Kowloon was owned by one of the oldest hotel companies in Asia and was actually one of the last to move towards computerization. Management was cautious in adopting computers, and when they did so the goal was to introduce a system that was faster and more efficient.

To a new guest, Cheifet said, the Kowloon's telecenter acted like a "smart TV," providing personal information like messages and the status of your hotel bill. The menu-driven system also featured general services like currency exchange rates and the local weather report. And if a guest was new to the area, they could call up a map or find out about tours to China. Guests could even request a keyboard-equipped telecenter, which then functioned as a telex and word processor.

Cheifet said that in order to provide these services, the Kowloon moved away from the conventional mainframe to its own LAN. Suen said this had the advantage of sharing resources and unlimited expandability.

The Kowloon's advanced computer network was more than just a convenience for guests, Cheifet noted. The hotel's billing records, guest history, and day-to-day accounting were all recorded online. If a frequent visitor called to reserve a room, the clerk could review the client's particulars from room preference and room rate to the visitor's special needs. The accounting system billed telephone calls and other charges to the guest's room almost instantaneously.

Cheifet added that this network approach also extended to the restaurants and room service. Online cash registers checked to see if a guest was still registered before charging a meal. And while the guest was having lunch, room service accessed the network when refilling in the in-room minibar, with an attendant entering the coded information directly into the telephone keypad, which was linked to the online billing system. And there were future plans to have the room staff communicate with the host computer using a remote terminal similar to a cellular telephone.

In spite of the hotel's commitment to its computers, Cheifet said, the management was not taking any risks. Electronic transactions were still copied onto paper. And the hotel's traditions of personal service were not about to disappear. Suen said that for instance, there were no plans to replace waiters with computer terminals. But that waiter might have a computer to improve personal service and speed up the efficiency of the operation.

Exchange Square

The next segment focused on Exchange Square. Cheifet said that when construction began on the complex in 1984, Hong Kong was in the midst of a serious real estate recession. No one was leasing or buying anything. So the owners of Exchange Square decided to make their project stand above the crowd by making it an “intelligent building.”

Martin Spurrier, the communications manager for the Hongkong Land Group, reiterated that at the moment the company acquired the site, the property market crashed for the same reason as it had in other cities like New York and London. But the Hong Kong crash was exacerbated by the political problems and the negotiations between the United Kingdom and China. So the company realized in order to lease their new building, it simply “had to be the best.”

At first glance, Cheifet said, the success of Exchange Square could be due to its favorable location, magnificent views, or “graceful” lines. But hidden within the building’s glistening skin–okay, this is starting to sound like porn now–were “intelligent” features that might be the most advanced of any shared-use office building in the world.

Spurrier said the global, 24-hour office environment was going to be the secret for Hong Kong, New York, London, and Tokyo–the four financial centers of the world. The ability for a company to come into a building and operate on all those markets around the clock was a key feature of Exchange Square.

Cheifet noted that Exchange Square was the home of Hong Kong’s new stock exchange, an amalgam of four different exchanges into one highly computerized operation. The orderly trading floor was a sharp contrast to the noise and chaos associated with other stock markets. Traders sat at banks of computer terminals around a central LED screen. About the loudest noise on the floor was the constant ringing of telephones. Remote terminals provided brokers with instantaneous trading information in English or Chinese. And when the Hong Kong exchange was closed, they could trade in other markets around the world, day or night.

Along with 24-hour access to global stock markets, Cheifet said, new tenants of Exchange Square shared electronic “plumbing.” The computer center provided each office with voice and data communications, word processing and financial database software, and a message switch to link the services together. Eric Vincent, the manager of Exchange Square, told Cheifet that the idea of sharing a common exchange seemed to be a good idea. So then they thought why not share other resources that were quite expensive if you wanted a large number of facilities, which the average small tenant couldn’t afford.

Electronic plumbing made Exchange Square more attractive to tenants, Cheifet said, and more expensive to build. But the project’s architect, Remo Riva, saw no conflict between design and function. Riva told Cheifet that the means of technology were getting smaller and smaller to the point where you often didn’t need visible wires. The technology was effectively an “invisible network” that surrounded you without really affecting the aesthetics or the more traditional appeals of the building.

Cheifet said that while not all tenants of Exchange Square used the shared resources, most companies found them worthwhile, much to the relief of the building’s owners. Spurrier said he was delighted with the way that things had gone, because nobody ever heard of “shared resources” before Exchange Square came on the map. At the moment, about 53 percent of tenants were using at least some of the shared services. Spurrier noted that rate compared favorably to other intelligent or shared resource buildings, most of which were in the United States, where there were only about a dozen up and running.

Exchange Square’s intelligence might not appeal to its larger tenants like IBM, Cheifet said, as Big Blue preferred its own computers. But it made sense to a lot of other companies like Baring Securities, which was the building’s first tenant. Baring, best known in history for having brokered the sale of the Louisiana Purchase, favored the idea of shared resources. William Phillips, a managing director with Baring, told Cheifet that one of the most expensive things about starting any office was the machinery, whether it was a word processor or PBX or telex machines. As a brokerage–essentially a cash business–Baring didn't want to spend $500,000 to $1 million upfront getting all that machinery in place before they could start trading. So the advantage of going into an "intelligent" building was that you didn't have to pay for any of it upfront.

Cheifet said in spite of the success of electronic plumbing in Exchange Square, some uncertainty remained, at least among the business users. Foremost among those concerns was security. Manager Vincent conceded that inevitably there always could be problems over security, although they had gone to great lengths to avoid any security problems. For instance, on the database computer system each terminal was connected to a port and the system had the passwords logged against that port. So even if one tenant learned another tenant's password, he couldn't go back to his office and access the system through his terminal.

The mixed group of over 150 tenants at Exchange Square presented another challenge to the designers, Cheifet said: How to provide companies with services to their individual business needs? Barings' Phillips said that to find the common denominators for all the tenants was not going to be an easy task. But things like word processing, telecommunications, telex, fax, and telephone were standard for everybody.

CitiCorp Center

Wendy Woods popped in to present a segment focusing on the CitiCorp Center in San Francisco. (Today it is more commonly known as One Sansome Street.) Woods noted this was one of the few intelligent buildings in the city. The computers at the CitiCorp Center could do just about everything but make coffee in the morning. The computers continuously tracked the amount of electricity being used, adjusted air temperatures, and reported on the status of all the doors through the use of magnetic sensors to determine if they were open or closed. The computers also monitored the lights, turning them off and on at selected times.

But Woods said that the computer's most important function was its management of the heating, ventilation, and air-conditioning

(HVAC) systems to cut energy usage and utility bills. Dick Robinson, a leasing agent for CitiCorp Center, told Woods that the computers monitored inside and outside temperatures, mixed that with the desired temperature, distributed it effectively as to where it was supposed to go, and determined the minimum amount of energy required to bring about the desired levels.

And should a fire occur, Woods added, the computers would pressurize the affected floor and those above and below it, purge the air, send the elevators down to the lobby, unlock the stairway doors, and turn on the sprinklers–all before the fire company arrived.

Woods said there was only one drawback to intelligent buildings and that was their cost. They could add 2 to 3 percent to the cost of construction. And that could add up to millions and millions of dollars. Which was why intelligent buildings may be the wave of the future, but they weren't necessarily the wave of the present.

HSBC Main Building

The final segment returned to Cheifet in Hong Kong. He said the colony's status as a major financial and hi-tech manufacturing center had placed it at the forefront of new applications of computers. One such application was the new headquarters of the Hongkong and Shanghai Bank (HSBC), designed by British architect Norman Foster and reputed to be the most expensive corporate headquarters building in the world. (Foster is probably best known today in the United States for designing Apple Park in Cupertino, California.) And although the HSBC building was just a few blocks away from Exchange Square, it looked as if it could be on another planet. Cheifet said the HSBC building's 47 stories sliced through an almost seamless skyline with a defiantly different profile.

Ray Guy, a senior manager with HS Property Management and not the former Oakland and Los Angeles Raiders punter who recently died, told Cheifet that the HSBC building had been designed to give flexibility and to have intelligence of its own in terms of operation. It was able to respond to changes in the law or technology. He said this was accomplished by taking the normal building plan and "turning it upside down." For instance, the space that was normally occupied in the ceiling by lighting and HVAC systems was now under the floor. Similarly, the lighting and fire protection systems were built into a fixed ceiling.

Cheifet noted the HSBC's external appearance reflected a lot about its "uncomprisingly unconventional" internal design. The entry to the building was up an escalator that took you through the curving glass "belly" of the lower floor, one flight above the street. The floors were suspended on pillars at each corner of the building, forming a kind of vertically stacked suspension bridge. This design made it possible to add new floors simply by "hanging" them from the supporting masts. And instead of artificially lit corridors and confined offices, the lower floors were wide open and arranged around a 12-story atrium. A computer-driven external reflector directed sunlight to 480 ceiling-mounted mirrors, bathing the interior with natural light.

Almost everything in the building was visible, Cheifet continued: the offices, the escalators, and even the circuit boards in the elevators. Guy said the architect liked everything that has to work to be visible. The lift cars were one aspect of this as they allowed people to see how the building itself worked as they traveled around it. There was also an LED message system within the elevator to welcome people and provide them with local stock index information.

Cheifet said the building's flexible design could be seen in its modular utilities. Removable floor panels contained electrical outlets, telephone and air-conditioning ducts were interchangeable, and no structural changes were needed to move an office. Lighting and ventilation were computer-controlled, but if someone needed to work late, they needed only to enter the right code into a telephone keypad to turn their area lights on again.

The bank's modular design extended to its computer services, Cheifet said, which added building-wide electronic plumbing to the other utilities. An intelligent communications network included phone sets that were coded to the individual, so if you moved to another part of the building, you would take your telephone along. The system would automatically find the phone's new location and forward calls directly to that unit.

Dr. Po S. Chung with the electronics department of the Chinese University–which I'm assuming was one of the HSBC building's tenants–told Cheifet that "modularity" and "decentralization" were two key concepts in this type of intelligent building. Each floor could have its own LAN and shared resources. So you could add more networking facilities on a modular basis.

Cheifet said that HSBC's computer network extended around the building and around the world. The system handled everything from office automation to global communications. Through an electronic banking network called Hexagon, corporate customers had 24-hour access to the world's major financial markets. Peter Greene with HSBC's electronic banking services told Cheifet that Hexagon was their way of using technology to keep customers up-to-date with what was going on with their bank and with financial markets around the world. From another point of view, he added, one didn't need a branch network with a system like Hexagon, as it delivered to the customer at his convenience all of the banking services they could receive via traditional methods. Who needed a branch network when in 10 or 15 years there was a "cashless society"? (Uh, about that, Peter.) Hexagon was currently a special service for business clients, Cheifet noted, but the bank's goal was to use the same technology to make all operations more efficient.

As with any other bank, Cheifet continued, security was a paramount concern. Computers were used to protect the bank and protect themselves. To gain entry to the main computer room required more than a password or magnetic card. The operations center was 100-percent redundant, and electronic data destined for outside terminals were encrypted before being sent. As for protecting the premises, the detective devices were elaborate. Ray Guy said the security system polled 3,500 points every 2 minutes within the building. They had computer-controlled patrols throughout the building where people had to check-in within a certain time limit or a patrol would be sent. There was also a computer-controlled surveillance system that selected cameras throughout the building and fed back into a main control room. At night those cameras also turned into motion detectors. They could detect something as small as a mouse walking around, Guy insisted.

While much of the bank’s business was conducted electronically, Cheifet said, for messages that could not be sent over wires, there were computer-controlled robots to deliver the mail. Lockable cars shuttled between floors on vertical tracks making pre-assigned stops. Each of these “rolling mailboxes” were programmable to go to a particular floor and alert the receiver of incoming mail.

Cheifet said that while computers were used heavily in the daily operation of HSBC, they were no less important in the design and testing of the structure well before it was built. Guy said the designers photographed the whole of Hong Kong and the computers then took that information to create a working model of the city. This was then used to calculate things like the potential impact of high winds on the building. Guy noted that the computer predicted that for a “1 in a 50-year storm,” the building could experience wind speeds of around 100 miles per hour. In fact, when Typhoon Ellen hit Hong Kong in 1983, there were recorded wind speeds of 93 miles per hour.

Even in a project as meticulously executed as the HSBC building, Cheifet said, not every problem could be anticipated or solved with a microprocessor. The placement of HSBC’s famous lion statutes at the building’s entrance, as well as the placement of the two main escalators, was determined only after a consultation with an expert in feng shui, the Chinese belief in the importance of man’s harmony with nature. Guy explained that the feng shui expert worked closely with the architects to ensure the building was “socially acceptable.”

At a cost of $600 million, Cheifet said, the HSBC building was probably the most expensive ever built. But the owners expected to recoup their construction costs through the building’s intelligent features. Still, the expense of this type of electronic plumbing had restricted its use to only a small percentage of new office buildings. Dr. Chung told Cheifet that at the moment, these buildings mainly targeted business customers. In the future, if the public wanted to access such data network features, it had to be more cost effective.

Bush Expected to Spend Less on Computers Than Reagan

Although this episode was produced in late 1986 and first aired in January 1987, the copy available from the Internet Archive was a rerun broadcast sometime in January 1989. Cynthia Steele presented the "Random Access" for this rerun.

- ABC News was marketing a Hypercard database containing information about the recent U.S. presidential campaign. (A similar database was used by ABC anchor Peter Jennings during ABC's on-air election coverage.) The three-disk stack would sell for $295 and used an interactive LaserDisc to recall candidate information and actual video footage. Steele said the product was intended for the educational market.
- Microsoft was offering a $75 rebate to *Lotus 1-2-3* users who switched to *Microsoft Excel*. Steele said that users actually had to send their *1-2-3* system disks to Microsoft to claim the rebate.
- MCI Mail would cut prices on February 1, 1988. The service's 800-number would now be toll-free instead of 10 cents per minute. Short messages would now cost 75 cents each instead of $1, and changes in fax pricing would net about a 22 percent savings on a two-page fax. Steele added that MCI Mail would also eliminate monthly fees and automatically upgrade all users to "advanced" service status.
- Western Union announced a new service called "Office Access," which let you transmit documents directly from your office's computer system. Steele said the new service would work with fax, telex, and Western Union's

Mailgram. Software was currently available for Wang computer systems, with versions for IBM and Digital Equipment Corporation machines expected by April 1988.

- Experts predicted that President George H.W. Bush's new administration would spend less on new computers and software than the Reagan administration and instead concentrate on making existing systems more effective. Steele added that many government employees were not happy with IBM's OS/2, citing the extra memory requirements and lack of application software.
- The Library of Congress disclosed that its main computer catalog system was struck by a virus in the fall of 1988. The virus was noticed by staffers who logged onto the system and found they had substantially less memory space than expected. Steele said the virus was believed to have originated on software obtained by a university, and fortunately it was rooted out before any data files were damaged. (The university in question was reportedly the University of Maryland.)
- The renewal of a 10-year U.S. technology agreement with China "hit a snag" on the issue of software copyright. Steele noted that Chinese law made no provision for copyrighting such materials and the government there was not inclined to sign any agreement leading in that direction. China said software producers were protected by contracts with their buyers, a position disputed by industry groups in the United States.

Barings, HSBC Represented Legacy of British Colonialism in Hong Kong

Exchange Square's first tenant, Baring Securities, was a subsidiary of Barings Bank, which was founded in 1762 by Francis and John Baring, the sons of a German wool merchant who had emigrated to Exeter, England. Francis Baring's son, Alexander, was largely credited as the Baring who helped arrange the Louisiana Purchase in 1803. As Philip Zeigler wrote in his history of Barings Bank, Alexander Baring, then acting as an agent of the Dutch bank Hope & Co., negotiated the price of the purchase with Napoleon's ministers, and Barings and Hope then "bought Louisiana from France and resold it to America." The British prime minister at the time, Henry Addington, initially blessed Barings' role in the deal despite knowing that Napoleon would likely use the money to finance a new war with Great Britain (which he did). The Barings and Hope banks happily pocketed about $3 million in profits according to then-U.S. Treasury Secretary Albert Gallatin, although Ziegler said the actual amount was unknown and probably lower than that.

Three years after concluding the Louisiana Purchase, Alexander Baring entered the British parliament as a member of the House of Commons, where he sat for the next 29 years. Towards the end of his tenure he also served briefly in Prime Minister Robert Peel's cabinet. Peel elevated Baring to the House of Lords in 1835, where he remained until his death in 1848.

Barings Bank itself continued to survive despite several downturns in its fortunes, largely due to its strong political connections. And while the venerable company may have been riding high when it moved into Exchange Square in 1986, Barings would not survive to see the end of colonial rule in Hong Kong. In January 1995, Barings collapsed in spectacular fashion when the 28-year-old head of the company's futures trading operations in Singapore, Nick Leeson, lost $1.4 billion in a series of reckless trades dating back to 1992. The Dutch banking group ING subsequently purchased Barings at liquidation for one pound and reorganized it as Baring Asset Management. That company was later split into two parts, with the Barings name and investment management business sold to the Massachusetts Mutual Life Insurance Company.

Like Barings, the Hongkong and Shanghai Banking Corporation also had its roots in British colonialism. According to Jean-Louis Conne, writing for *Le Monde diplomatique* in 2010, HSBC can actually trace its history directly back to the Opium Wars. In 1854, the British steamship company P&O merged with the British India Steam Navigation Company, with the latter's owner, Scotsman James Mackay, becoming chairman of the combined company. As Conne explained, Mackay and his superintendent in

Hong Kong, fellow Scotsman Thomas Sutherland, greatly expanded the opium trade into China during the 1850s and 1860s, which prompted the Second Opium War. It was the need to finance the opium trade that led Sutherland and a group of investors to found the Hong Kong and Shanghai Banking Corporation in 1865.

In 1993, HSBC reorganized as HSBC Holdings in London. This was a legal move made in anticipation of the resumption of Chinese sovereignty over Hong Kong four years later. HSBC has continued to use the Main Building in Hong Kong as its business headquarters up until the present day. The building actually gained notoriety as the site of a 10-month protest in 2011 and 2012, which was the local branch of the worldwide "Occupy" movement that spawned similar protests around the globe, including "Occupy Wall Street" in New York City.

Notes from the Random Access File

- This episode is available at the Internet Archive and likely aired originally around January 20, 1987. As previously noted, the Archive version was a rerun first broadcast two years later in January 1989.
- The earliest source I could find discussing the concept of "intelligent buildings" was a December 1983 article by Steve Brown for the *Dallas Morning News*. Brown noted that "smart office buildings" were now being built with three major types of features: automation systems, internal communications, and external communications. He credited this "revolution" in part to the breakup of AT&T and the resulting competition from telecommunications companies offering new services to business customers.
- Martin Spurrier was a British Army officer before going into public relations in the late 1960s. Spurrier spent 13 years at Hongkong Land and later served as Asian regional chairman for Weber Shandwick. In 2002, he joined the public relations firm Edelman as an executive vice president. He stepped down from that position in 2008 but remained a non-executive chairman. In retirement, Spurrier moved to Billingshurst, England, and served as

chairman of the local Chamber of Commerce during part of the 2010s.

- Remo Riva is still an active architect and director with P&T Group in Hong Kong, the same firm where he designed Exchange Square.
- William Phillips remained with Baring Securities until 1992 when he moved to Salomon Brothers in Honk Kong as a managing director. He left that position in 1997 to return to the United Kingdom, where he later co-founded FPR Investment Partners LLP.
- ABC News marketed at least three different Hypercard-videodisk hybrid products in 1989. According to *NewsBytes*, one of the other interactive programs focused on Martin Luther King, Jr., including the uncut version of his famous “I Have a Dream” speech and “interviews with other civil rights activists.”
- The *Power House* software that Stewart Cheifet showed in the introduction was part of a series of products known as the X-10. First developed by Pico Electronics in 1975, the X-10 protocol used signals transmitted through a home’s power lines to control devices. Clint Basinger of the YouTube channel *LGR* demonstrated the X-10 *Power House* using an IBC PC-AT in a 2017 video.

Chapter 4: The Tax Advantage, MacInTax, TurboTax, and PC/Tax Cut

While annual-release franchises are now a common feature of computer games–think *Madden* or *Call of Duty*–the practice arguably originated with tax preparation software. After all, tax laws (and tax forms) in the United States change every year, so the software must be constantly updated. This fact made tax preparation a lucrative field for small software companies to enter during the 1980s, when the personal computer market was still struggling to find a foothold in the home.

This next *Computer Chronicles* episode from February 1987 focused on four different tax preparation programs, all of which were made by relatively small companies. Stewart Cheifet opened by showing Gary Kildall an Internal Revenue Service online database containing tax information (running on a Leading Edge PC.) Cheifet said this was a pretty valuable database. You could get virtually any IRS tax publication and download tax forms, which beat going to an office and waiting in line or calling on the phone.

Cheifet said that tax preparation software seemed like the kind of thing that might get people to buy a home computer. Kildall replied it was one of the components of that sale. It was difficult to sell a home computer just for tax preparation. But every family had to do taxes, so that program could pay for itself and even earn you money back.

Cheifet noted that tax preparation seemed like a good case for the use of CD-ROM technology. Kildall, who at the time ran KnowledgeSet, a CD-ROM software company, joked that Cheifet had just given him a new product idea. But he agreed that online services like the IRS database could be replaced by CD-ROM fairly well, especially given the annual changes to the tax code.

H&R Block Experimented with Online Filing

Wendy Woods presented her first report, which featured some B-roll footage of people getting their taxes done at an H&R Block center in Sacramento, California. Woods said that for most taxpayers, the month of April was not something to look forward to. Preparations for the inevitable April 15 filing deadline brought to mind accountants, adding machines, and stacks of forms to fill out and mail, even if you were just expecting a refund.

This year, Woods said, there was some good news for certain taxpayers, thanks to the arrival of electronic filing. This Sacramento H&R Block office was one of a handful across the country that was taking part in a pilot program allowing taxpayers to file their returns online. At present, only those expecting a refund could file this way. But the IRS hoped to expand the system if it proved successful.

Woods said that electronic filing still required a fully prepared return. Once the information was verified, the return was attached to a special IRS form and taken to H&R Block's data processing center, where it was transferred directly to IRS computers. The software wouldn't look unusual to anyone who had filed taxes, as most screens duplicated the appearance of standard forms and therefore only required transferring names and numbers from the paper to the screen. The operator simply picked the appropriate form from the main menu and filled in the blanks. There was even a spot for the signature, although the IRS wanted each filer to sign with pen and paper–at least until the computers offered a foolproof method of identifying signatures.

Electronic filing required less paper and less time in the mail, Woods added, which meant faster processing for the taxpayer and the IRS. Best of all, it meant getting your refund check about three weeks sooner.

Tax Advantage Offered Support on Multiple Platforms

Henry H. Hilton joined Cheifet and Kildall for the first studio segment. Hilton was president of Double Eagle Software. He was also the co-author (with Harry Koons) of Double Eagle's *The Tax Advantage*, a tax preparation program for the Apple II, IBM PC, Atari ST, and Commodore 64.

Kildall asked Hilton how he got into the tax preparation software business. Hilton said back in 1980, he and Koons had purchased Apple II and Atari 8-bit computers, respectively, and they did their taxes that year using *VisiCalc* spreadsheets. And they decided then there must be a better way. Eventually, they developed *Tax Advantage* and before long found a company that was willing to publish it. This was now the fifth year they'd been doing the program.

Kildall asked for a demonstration of *Tax Advantage*. Hilton pulled up a copy of a sample return running on the in-studio computer. (It looks to me like an Apple II but I'm not certain.) He explained that one of the program's key features was the ability to itemize almost any line on a 1040, the standard form used for personal income tax returns. For example, line 7 asked for income from "wages, tips, etc." Hilton had entered separate line items for both the taxpayer and their spouse's respective earnings under this heading. The sum of the two was then displayed in the upper right-hand corner. He quit back into the main 1040 screen, which showed the final line 7 total. Hilton then typed a new line 7 amount directly in this main screen to show how the software automatically recalculated the user's tax bracket (what percentage of income they owed) and tax liability. There was also a "reverse" feature to undo that change.

Hilton next showed that you could type in a specific line number on the main screen. He typed "34" to go to line 34, which displayed Schedule A deductions from taxable income. Cheifet clarified these line numbers corresponded to the actual 1040 form. Hilton said that was correct. He then pulled up Schedule A, which took a few moments to load from the floppy disk. While it was loading, Hilton noted *Tax Advantage* ran on all Atari 8-bit computers, the Atari ST, all the IBM PCs and compatibles, and the Apple II line. Cheifet said the software was then aimed at the home user. Hilton said yes, but it turned out that his research suggested about 15 percent of the customers who bought *Tax Advantage* were themselves tax preparers.

Hilton continued with his demo, showing the Schedule A loaded from disk. He entered some additional sample data. Kildall asked if you could actually print out the final data on a form. Hilton said the user could print out a "draft" form that was useful for making notes and with the exception of the 1040, *Tax Advantage* could print out the final schedules in an IRS-acceptable facsimile format. For the 1040 itself, the user would have to align an actual IRS form in their printer to match up with the program's data.

Printing IRS-Accepted Forms from a Macintosh

Susan Morgan joined Cheifet and Kildall for the next segment. Morgan was president of SoftView, Inc. Her company published *MacInTax*, which as you can probably guess was a tax preparation program for the Apple Macintosh.

Kildall asked about the impact of home tax preparation software on professional preparers. Did they like that or not? Morgan said some of them did. The tax preparation packages for the home sometimes could be used for a person to organize their information, which they then took to a professional to do the hard stuff. But most people who used tax preparation software probably didn't go to professionals anyway.

Cheifet asked for a demonstration of *MacInTax* on a Macintosh Plus in the studio. The program was already running and displayed a graphical recreation of the 1986 IRS 1040 form. Morgan showed how you could point-and-click on a line on the form and enter data directly. Hitting "return" automatically moved the cursor to the next field. The software could also format data as the user typed, for example inserting the dashes into a Social Security number. You could also point-and-click on the form's check boxes.

Morgan next scrolled down on the 1040 to enter income data. She reiterated the software automatically formatted data to insert the commas and decimal points in dollar figures. And each time the user hit "return," the program automatically recomputed all of the totals. Another feature was itemization. You could break down a total. Double clicking on a field pulled up an itemization window. For her example, she itemized alimony payments (from multiple ex-husbands) for line 11 on the 1040. Once the window was closed, all of the totals on the main form updated.

MacInTax also had the IRS instruction booklet stored online–meaning on the software, not on the Internet–so if you clicked on a line it would pull up the corresponding instruction in a separate window. The program also included 24 IRS schedules and 15 specially designed worksheets to assist with computations. The names and Social Security numbers from the main 1040 were automatically transferred to these schedules and worksheets.

Cheifet clarified that you could import data into *MacInTax*. Morgan said that was correct. That was a brand new feature of the program. You could import data from an accounting package, spreadsheet, database, or personal finance software–anything that could store text files. Morgan demonstrated this by importing data from an unspecified accounting package. The imported data came up in a separate window, and you could drag-and-drop individual data items from that window into the main 1040 form.

Kildall asked if the user could print out the completed forms on a laser printer. Morgan said yes. You could also use an Apple ImageWriter (a dot matrix printer). She demonstrated the print function of *MacInTax*, which she said could print the finished documents out on plain paper. The final printout mimicked IRS forms and was actually approved by the IRS. So you could sign the printed form and file it with the IRS. Morgan added that this was the first time the IRS had allowed this.

Cheifet asked about other forms and schedules. Morgan said *MacInTax* could do all IRS forms. Kildall asked about state income tax forms. Morgan said there was a California state supplement which could also print out approved forms. Kildall asked if *MacInTax* converted the federal data to the state form. Morgan said yes, the software handled that data conversion automatically.

Cheifet asked what would happen if a taxpayer was audited. Could you walk into the IRS office with your floppy disk? Morgan said you could walk in with your printouts. She said an actual *MacInTax* user reported they were called in for an audit. He walked in with his printout and ended up not having to pay a penny.

What Did the IRS Think of Home Tax Prep Software?

Wendy Woods returned for her second segment, where she interviewed IRS public affairs spokesperson Larry Wright at the agency's northern California office. Woods noted there were a variety of packages that taxpayers could use to prepare taxes at home. What was the IRS' position on this software? Wright said the single greatest mistake made by taxpayers was a mathematical error. And since computers were mathematically 100-percent accurate, assuming the formulas were correct, the IRS believed that filing with a computer to help you was bound to result in a higher level of accuracy and therefore more returns being accepted the first time.

Woods asked what was the biggest problem right now with the use of home tax preparation software. Wright said if the data that the taxpayer put in–or the package itself–created an error, those errors were then magnified by the number of people who purchased that particular software package. So the IRS had some concern as to the accuracy of packages that were on the market.

A lot of the packages generated forms as well as the calculations, Woods noted. What was the IRS' position on users sending in those forms? Wright said those tax packages that generated a form that does not match exactly the IRS forms were going to create problems and might not be acceptable to the agency.

Woods said the IRS recommended using the same procedure for choosing tax software as you would a doctor: ask around and get a reliable name. If you went with a fly-by-night company, you would get a fly-by-night return. And you were ultimately responsible for your own income tax.

Battle of the MS-DOS Tax Programs

Michael Chipman and James Petersen joined Cheifet and Kildall for the final segment. Chipman was president of ChipSoft, Inc., which published *TurboTax*. Petersen was president of Best Programs, Inc., which published *PC/Tax Cut*.

Kildall asked Chipman how a tax preparation program could actually save you money. Chipman said the savings came from allowing you to calculate the taxes the way you wanted to. You could "What if?" your taxes and find the best way to file. Cheifet followed up: If you did the numbers right there was only one way to do it, wasn't there? Chipman said that wasn't strictly true. There were many ways to file a tax return in certain cases. Some deductions could be taken on different schedules, which could affect the final tax liability. Cheifet clarified that meant looking at different tax strategies as opposed to different numbers.

Kildall turned to Petersen and asked for a demonstration of *PC/Tax Cut*, which was running on a Compaq Portable. Petersen said they'd been publishing the software for four years now and kept it simple. *PC/Tax Cut* was both a tax preparation and tax planning program. The latter was especially handy given the recent changes to the tax laws.

Petersen pulled up a sample return loaded into *PC/Tax Cut*. He showed how you could enter an itemized deduction for medical expenses. The software brought up an itemized list of medical expenses, such as doctors bills and medicine costs. Petersen emphasized that *PC/Tax Cut* did not follow the IRS forms. The program "restated" the questions and took all the formulas and calculations out of them, which made it easy for the user to enter data.

Petersen then returned to a main menu and presented a summary of the tax data, which showed all the calculations and displayed the refund the user could expect to receive. The user could then go back into the program to make corrections or print out forms. *PC/Tax Cut* printed out the 1040 on an IRS pre-printed form while making IRS-approved facsimile forms of the schedules. The 1040 forms came supplied with the software.

While Chipman got his demo set up, Cheifet asked Petersen if using a program like *PC/Tax Cut* was in lieu of going to a tax preparer, or could you use the software with a tax preparer. Petersen said for most people it was in lieu of using a tax preparer. But if you had an unusual situation and wanted somebody to give you advice, many *PC/Tax Cut* users brought their printouts to a tax preparer to review them.

Kildall asked if there was any liability from Best Programs' standpoint for giving "bad advice" through the software. Petersen said that issue was "in limbo." The IRS had issued a ruling that said firms like his could be held liable as tax preparers. So for any return that contained a mistake they could be penalized up to $100. But he said Best Programs guaranteed *PC/Tax Cut*'s calculations for three years to the extent that the company would pay any penalty arising from a software bug. So far, he said there had not been a single claim.

Cheifet next asked Chipman to demonstrate *TurboTax* and explain how it was different from *PC/Tax Cut*. Chipman said the main difference was that *TurboTax* strictly adhered to the IRS forms. He felt the IRS had managed to do a pretty good job boiling down the complicated tax system and with *TurboTax* you only had to know one set of forms–the government's–as opposed to learning a separate set of forms used by the software.

Chipman then showed how you could enter depreciation on the appropriate IRS form. *TurboTax* asked a series of questions about the asset. The software then calculated the depreciation automatically. That information was then transferred to the main tax return.

Cheifet asked for more information on how *PC/Tax Cut* and *TurboTax* could actually be used for tax planning. Chipman said that *TurboTax* had the new 1987 tax rules built-in to the program. That could be used to assess your tax situation throughout the year. Cheifet clarified you could be "playing" with what your return might look like under the new rules during the year. Chipman said absolutely. Petersen added that *PC/Tax Cut* also contained the 1987 tax rules so you could use that to estimate your tax obligations for next year. He added that more taxpayers should pay attention to that since the tax rates (brackets) had changed and a lot of people could end up paying more taxes.

Hackers Took Down Arizona Town, University President

Stewart Cheifet presented this week's "Random Access," which was recorded in February 1987.

- Compaq announced the Portable III, an IBM PC-AT compatible running at 12 MHz. Cheifet said the basic model came with 640 KB of RAM and a 1.2 MB floppy disk drive, and there were optional 20 MB or 40 MB hard disks available. The Portable III was considered a "luggable" at 18 pounds and prices would range from $4,000 to $6,000.
- British computer manufacturer Apricot announced a new Intel 386 machine for $4,500. Cheifet said it came with 1 MB of RAM and a 30 MB hard drive and was bundled with MS-DOS, GW-Basic and Microsoft Windows with a word processor and spreadsheet.
- Sinclair announced an IBM-compatible portable computer

with an LCD screen and a Zilog Z80 microprocessor.
- Scientists at the University of South Carolina and New York University told the American Association for the Advancement of Science that progress had been made in the design of “neurochips,” i.e., computer chips based on the architecture of the human brain. Cheifet said the scientists predicted that within 5 to 10 years such chips would be used to help paraplegics walk.
- New word processors like *Microsoft Word* and *MindWrite* had extensive page layout and graphics functions built-in, which could make true Steve Jobs’ prediction that desktop publishing would cease to exist as a separate software category within the next two years.
- Paul Schindler reviewed *UX-Basic* (Human Computing Resources, $400), a professional BASIC language development tool.
- A new program called *W-4 Helper* guided users through the new IRS withholding forms.
- Michigan’s treasury department installed a new computer to answer taxpayer questions about the status of their refund.
- A hacker got into the computers for the town of Prescott Valley, Arizona, and erased all of the town’s financial records.
- The University of Charleston’s student newspaper printed the personal financial data of the school’s president, which had been provided by a hacker who broke into the computer network.
- Rutgers University professor Edward Fry said children should no longer be taught cursive writing. Instead, children should be taught to write in block letters in first and second grade, then be taught computer keyboards starting in the third grade.

How TurboTax Stood Alone Against All Challengers

Of the four products discussed in this episode, *TurboTax* is the one that endured. Indeed, *TurboTax* today is one of the major players in what is now predominantly the market for online income tax filing services. Intuit is now the company behind *TurboTax*, and the story of how it acquired that product–and by extension 2 of the other 3 tax packages demonstrated in this episode–will be the main focus for the rest of this post.

A Split Tax Advantage

But first let's address the one outlier, Double Eagle Software's *The Tax Advantage*. This program likely debuted on the market sometime in late 1983. It was originally published by Arrays, Inc., under the brand name of Continental Software. Henry Hilton and Harry Koons authored the program and licensed it to Arrays. Prior to getting into tax software, Hilton had a long career as a nuclear physicist, having earned his doctorate from Yale in 1960 and spending many years with the Aerospace Corporation's Space Physics Laboratory.

After updating *Tax Advantage* for a few years, Hilton and Koons broke with Continental in 1986. Hilton and Koons claimed that Arrays failed to pay royalties on the 1985 edition of *Tax Advantage*. An Arrays executive told *InfoWorld* that the company terminated its licensing agreement with Hilton and Koons because a large number of copies of *Tax Advantage* were returned unsold. Hilton and Koons then formed Double Eagle Software in August 1986. For some reason, Arrays allowed Double Eagle to continue using *The Tax Advantage* name for its product; at the same time, Arrays published a completely different program under the name *The Tax Advantage 2*.

It seems that neither company benefited from the split in the long run. Arrays went out of business in the late 1980s. Double Eagle closed up shop at the end of 1991. Hilton died a few years later, in February 1998, at the age of 67.

ChipSoft, SoftView Dominated Early Tax Prep Market

The other three companies profiled in this episode all had remarkably similar origin stories. The first on the scene was Best

Programs, Inc. James Petersen co-founded Best Programs in November 1982 with his brother, Ken Petersen. It was a typical garage startup. James Petersen's background was in naval intelligence, not computer software, but he apparently decided personal finance software would be a good market to get his feet wet. *PC/Tax Cut* and *PC/Personal Finance Program* were among the company's first products, coming out sometime in early 1984.

It was also in 1984 that ChipSoft entered the picture. Michael Chipman had been working as a programmer for Scientific Applications International Corporation. He told the *Los Angeles Times* that he purchased an IBM PC in late 1983 specifically to help him prepare his tax return. But he said that when he went looking for a tax program he found them all "overpriced or underpowered." That's when he decided to write his own program–what became *TurboTax*–over the next six months. Chipman quit his job at Scientific Applications in mid-1984 and formed ChipSoft with his spouse, Evy Chapman, which like Best Programs was originally a garage startup.

Our final company, SoftView, was also started by a husband-and-wife team. Susan Morgan told the *Los Angeles Times* that the whole thing began when she was working for the business equipment manufacturer Burroughs Corporation. In 1984, Burroughs mistakenly paid Morgan an additional $4,000 in maternity benefits. She spent the money on a new Macintosh, which her husband, Michael Morgan, used to develop *MacInTax*. (Morgan said she later repaid Burroughs.)

The Morgans then raised about $100,000 from local computer clubs and relatives, which enabled them to produce and sell 500 copies of *MacInTax* in early 1985. Morgan formally incorporated SoftView in June 1985.

TurboTax and *MacInTax* quickly became the dominant consumer tax preparation programs for the MS-DOS and Macintosh platforms, respectively. A few months after Michael Chipman's appearance on *Chronicles*, ChipSoft moved into a new 30,000 square foot facility in San Diego. Another move followed into an 80,000 square foot office park just two years later in 1989.

By that point, Chipman decided the company had become too big and complex for him to run anymore. The Chipmans sold their stock in ChipSoft to a private equity firm, Warburg Pincus, in early 1990 for $25 million. Chipman remained on as chairman of the board. But Warburg Pincus brought in a new CEO, Charles H. Gaylord, Jr., a former oil and transportation industry executive; and a new president, William H. Harris, who had been an executive vice president in charge of business operations for *U.S. News & World Report*. (Harris later served as the founding CEO of PayPal.)

Harris convinced Gaylord early on that *TurboTax*, which even in 1990 was still exclusively an MS-DOS program, had to get onto the Macintosh and Windows platforms. With respect to the former, the simplest way to accomplish their goal was to buy the existing leader, which just happened to be Susan Morgan's *MacInTax*.

Indeed, in the early 1990s *MacInTax* held a virtual monopoly on Macintosh tax preparation software, with some reports suggesting a market share as high as 95 percent. And it seemed that like the Chipmans, the Morgans were ready to cash out. Susan Morgan had actually turned over day-to-day operations at Softview to a new president, Kathleen Lane, in 1988. And in January 1991, Morgan announced at that year's MacWorld Expo that she had decided to leave the company altogether "to pursue other interests." A few months later, the *San Francisco Examiner* reported that Morgan joined SBT Corporation, a privately held software company, to head its new Macintosh division.

With Morgan moving on, she and her husband agreed to sell SoftView to ChipSoft in July 1991. (*MacInTax* continued as a standalone program for awhile before being absorbed into a cross-platform *TurboTax* completely by the mid-1990s.) Around that same time, Gaylord and Harris decided to approach Intuit about a possible merger. Intuit wasn't in the tax software business, but its personal finance program *Quicken* was the market leader in that category.

Like the other companies discussed here, Intuit was started by two people, although they were not related by blood or marriage. Scott Cook was a former brand manager at Procter & Gamble–he oversaw the marketing of Crisco–who had moved to California in the early 1980s to work for the management consulting firm Bain and Company. Cook's wife, Signe Ostby, took a job at Software Publishing Corporation, which published the *pfs* business software series. According to Cook, Oltsby inspired him to create *Quicken* when she complained about having to do the family's bills.

Not having any background in programming or starting capital, Cook went to nearby Stanford University to post some fliers looking for cheap programmers to bring his idea to life. While searching for a bulletin board, Cook ran into a student, Tom Proulx, who immediately took an interest in the concept. Proulx told Cook he wanted to be a partner rather than an employee, however, and Cook agreed.

I'll no doubt delve more into the history of Intuit and *Quicken* in a future post. But suffice to say that while it took *Quicken* a few years to take off, by 1991 it was the number-one personal finance program. What Intuit lacked, however, was any presence in tax preparation software. Proulx wanted to change that by acquiring an existing program. And his first choice was not ChipSoft's *TurboTax*, but rather a less popular alternative that was originally called *Ask Dan About Your Taxes*.

This brings yet another company into the mix: MECA Software. The Connecticut-based MECA was basically the number-two company in both personal finance and tax preparation software. On the finance side, MECA published *Andrew Tobias' Managing Your Money*, named for a well-known finance journalist and author. This was then followed with *Andrew Tobias' TaxCut*.

Now you might be asking yourself, "Wait, is this the same thing as *PC/TaxCut*?" And the answer is, "yes and no." To be honest, the timeline gets a bit muddled here. What apparently happened was that the Petersens decided to focus Best Programs on software for tax professionals rather than consumers. So they sold *TaxCut* to MECA, which re-branded it under the "Andrew Tobias" name. But then MECA took a page from Continental Software and decided to license a new code base for the *TaxCut* name from Legal Knowledge Systems, a one-man software company started by former tax attorney Daniel Caine. That would be the "Dan" in *Ask Dan About Your Taxes*.

So to recap, in 1991, MECA Software publishes a tax preparation program that uses the *TaxCut* name it bought from Best Programs combined with the code it licensed from Dan Caine. Meanwhile, over at Intuit, Tom Proulx wants to acquire Caine's code so that his company can get into the tax preparation software market.

The MECA Affair

This all set the stage for a two-year period between 1993 and 1995 when things got really wacky. MECA, which had gone public in 1990, decided to put itself up for sale. The two bidders were Intuit and ChipSoft. Both companies sent representatives to a meeting held at a Connecticut hotel over the weekend of April 10-11, 1993, to present their offers to MECA's board.

But a week before that meeting, Proulx and Intuit decided to hedge their bets by acquiring the rights to Dan Caine's code. Intuit signed an option to acquire Legal Knowledge Systems outright from Caine–a deal that could only be stopped if both parties agreed. Caine and Proulx reportedly negotiated in an all-night session that ended just 20 minutes before Caine was scheduled to meet Gaylord and Harris from ChipSoft, who were basically only interested in acquiring Caine's code so they could bury it.

Fast forward to the Connecticut meeting a week later. Intuit offered to purchase MECA in an all-stock transaction valued at $63 million. ChipSoft offered $60 million in cash. The MECA board accepted the ChipSoft offer. It was only then that ChipSoft learned about Caine's option agreement with Intuit.

The story might have ended here with ChipSoft acquiring MECA and Intuit getting Caine's program as a consolation prize. But then the U.S. Justice Department intervened. In July 1993, the Department's Antitrust Division announced plans to oppose the merger, as it would effectively give ChipSoft 75 percent of the tax preparation software market. Following the DOJ announcement, MECA and ChipSoft decided to abandon the deal.

Shortly afterwards, ChipSoft's Bill Harris met with his counterparts at Intuit to propose a merger between their two companies. Despite the friction described above, the two companies were on friendly terms. Intuit had previously bundled copies of *TurboTax* with *Quicken* for sale during the holiday season. And Proulx was still convinced that Intuit needed to be in the tax preparation business. While he still preferred Cain's software to *TurboTax*Intuit ultimately decided that ChipSoft's strong management team was more valuable.

The two companies announced a deal on September 1, 1993, just two months after ChipSoft abandoned the MECA acquisition. The all-stock transaction was valued at around $232 million. Basically, ChipSoft's shareholders acquired a combined 39 percent stake in the combined company, which retained the Intuit name. ChipSoft was then renamed Intuit South.

A few weeks later, H&R Block acquired MECA Software–including the *TaxCut* name–in a $32.2 million stock transaction. Dan Caine also agreed to a buyout of his option with Intuit and subsequently joined H&R Block as its vice president for consumer tax software.

Microsoft's Failed Takeover Attempt

With the ChipSoft deal completed, Scott Cook announced at the fall 1993 COMDEX show that he planned to step down as Intuit's CEO while remaining chairman of the board. John Doerr, a former *Chronicles* guest, venture capitalist, and Intuit board member, recommended Bill Campbell to take over for Cook. Campbell, a former Apple marketing executive who served as CEO of Claris and GO Corporation before joining Intuit, decided to continue the acquisition spree well into 1994. Of note, Intuit acquired Parsons Technology, publisher of the tax preparation program *Personal Tax Edge*, which was then shut down; and National Payments Clearinghouse, a company that provided electronic bill payment services.

Both of these acquisitions were defensive moves aimed at stopping Microsoft from gaining a foothold in the personal finance software market. (You knew that Bill Gates would come into this story at some point.) Microsoft had entered the field with *Microsoft Money* in 1991, but it lagged behind *Quicken* in popularity. Intuit had bought Parsons so that Microsoft couldn't buy it. And National Payments Clearinghouse just happened to be the company that provided the back-end services for *Microsoft Money*'s bill payment feature.

Bill Gates took the hint. In September 1994, he sent Cook an email suggesting the two companies should discuss a merger. After a couple of weeks of negotiations, Microsoft announced a deal to purchase Intuit on October 13, 1994, in a $1.5 billion stock swap. The plan was for Intuit to remain an independent unit within Microsoft overseeing financial products, while Microsoft would sell *Money* to a third party.

Once again, however, the Justice Department's Antitrust Division stepped in and said "no." It turned out the timing worked out poorly for Microsoft. In February 1995, a federal judge rejected a proposed antitrust settlement between the Antitrust Division and Microsoft dealing with alleged abuses of the company's operating system monopoly. Chastised for being too lenient with Gates and company, the Antitrust Division concluded that it had no choice but to challenge the Intuit acquisition. Microsoft then decided it wasn't worth a fight, so they abandoned the deal on May 19, 1995.

As a postscript, the day after Microsoft left Intuit at the proverbial altar, Scott Cook received a delivery of festive balloons from America Online CEO Steve Case. Case proposed his own partnership with Intuit that would have had each company purchase a 20 percent stake in the other. That deal never happened, but it did signal the coming changes to the tax preparation software market as the transition began to online filing.

Best Programs Ended Up with British Firm

Just to wrap things up, let's briefly discuss what happened to

Best Programs, Inc. In April 1994, Best Programs sold its remaining tax software business–this was for the professional preparer market as opposed to individuals–to Intuit. Three years later, in October 1997, the company changed its name to Best Software, Inc., and went public, raising $54 million in its initial offering. By this point, Best Software was primarily selling human resources and payroll management software to businesses. In January 2000, the United Kingdom-based Sage Group PLC purchased Best Software for $445 million in cash. Thereafter, the company became a U.S. subsidiary of Sage, which is still in business today under the Sage name.

After the sale, James Petersen retired to Jackson, Wyoming, and pursued his hobby in digital photography for several years before passing away in October 2006 at the age of 62.

The other two guests from this episode, Michael Chipman and Susan Morgan, are still alive as of this writing. Morgan decided to pursue a career change into law. She earned her law degree from Santa Clara University School of Law in 1998. After working in corporate law firms during the late 1990s and 2000s, she started her own practice, Morgan Legal Services, in 2012. Morgan and her husband also started a private equity analysis firm, Equilytics, in 2005.

Michael Chipman largely retired after the sale of ChipSoft to Intuit. He reemerged in the public eye in February 2002, when he and three other partners agreed to invest $160 million over 10 years in the Arizona Diamondbacks baseball team. Two years later, in March 2004, Chipman and his partners acquired control of the team from founding owner Jerry Colangelo. Chipman remains a general partner to the present day.

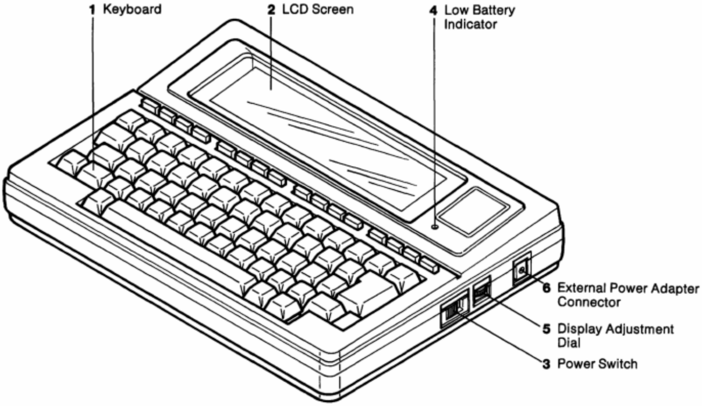
Notes from the Random Access File

- This episode is available at the Internet Archive and has an original broadcast date of February 19, 1987.
- Larry Wright continued to work as an IRS spokesperson well into the 2000s.
- John Gibson of the University of South Carolina and

Andras Pellionisz of New York University were the scientists who made the "neurochip" announcement. In addition to helping paraplegics walk again, the scientists claimed their technology would "enable the building of robots that can see and feel," according to the Associated Press.

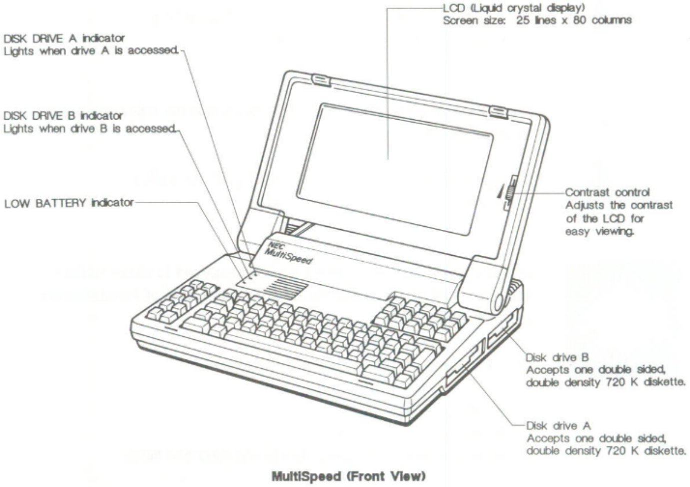
- Dr. Edward Fry was director of the Reading Center for Rutgers' Graduate School of Education when he made his pronouncement about children learning keyboards instead of cursive writing. In a Rutgers press release, he added that by the year 2000 "computer terminals will be everywhere, including most businesses and homes." Fry taught at Rutgers for 22 years before retiring and died in September 2010 at the age of 85.
- In addition to the usual stack of old newspaper articles, I did want to mention a couple of key sources for this blog post: Suzanne Taylor and Kathy Schroeder's 2003 book *In $ide Intuit: How the Makers of Quicken Beat Microsoft and Revolutionized an Entire Industry*; and oral histories given by Scott Cook, Tom Proulx, and Eric Dunn of Intuit to the Computer History Museum.

A close-up shot of Stewart Cheifet holding a Convergent Technologies Workslate portable computer. The Workslate was a large, flat black tablet with a small LCD screen built-in to the top left corner, a micro-cassette drive built-in to the top right corner, and a keyboard composed of small circular keys covering the lower half.



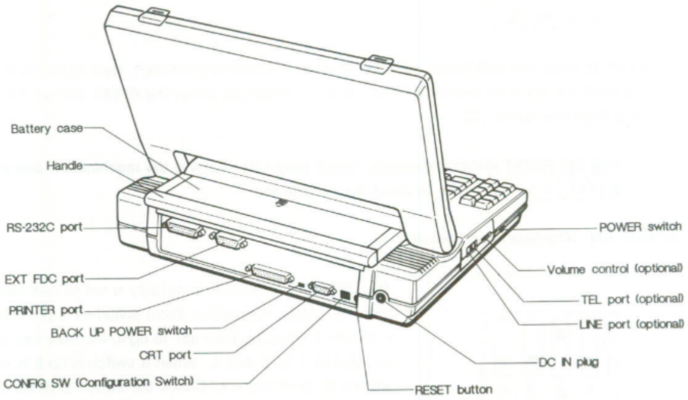
A black-and-white diagram showing the front view of a TRS-80 Model 102 computer. The computer is a small tablet-like device dominated by a keyboard. There is a smaller LCD screen that takes up the top third of the unit. On the right side are a power switch, a display adjustment dial, and an external power adapter connector.

Bob Wade on the set of “Computer Chronicles.” On the desk in front of him is a TRS-80 Model 102. In his right hand, Wade is holding a large black cellular telephone, which resembles an old CB-style radio.


LCD (Liquid crystal display)
Screen size: 25 lines x 80 columns
DISK DRIVE A indicator
Lights when drive A is accessed.
DISK DRIVE B indicator
Lights when drive B is accessed.
LOW BATTERY indicator
NEC MultiSpeed
Contrast control
Adjusts the contrast of the LCD for easy viewing.
Disk drive B
Accepts one double sided, double density 720 K diskette.
Disk drive A
Accepts one double sided, double density 720 K diskette.
MultiSpeed (Front View)

A black-and-white diagram showing a front view of the NEC

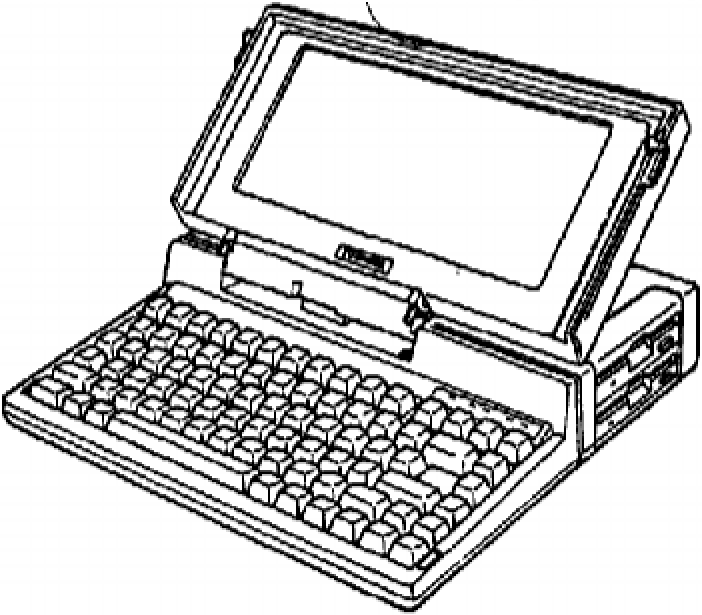
Multispeed. The Multispeed's LCD screen is flipped into an open position. The diagram shows the location of the two disk drive indicator lights on the top left side of the keyboard, the disk drives on the right side of the machine, and a contrast control for the LCD screen.



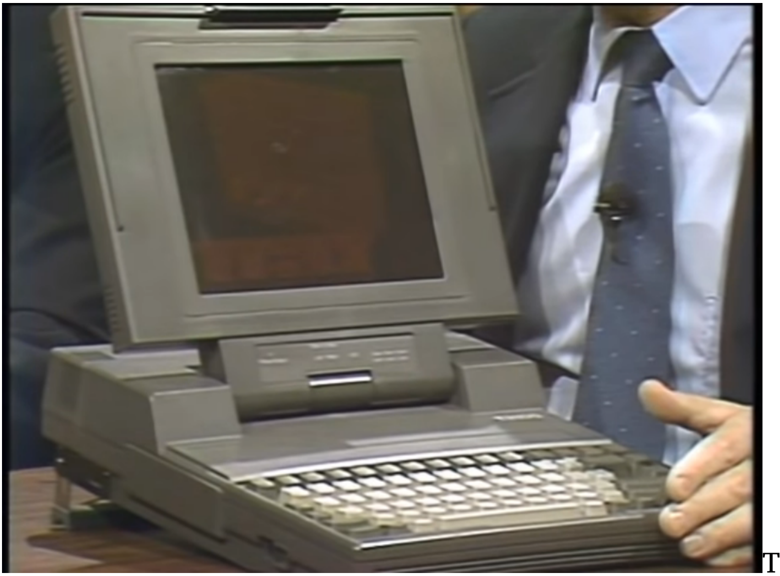
MultiSpeed (Rear View)

A black-and-white diagram showing a rear view of the NEC Multispeed. The diagram shows the various ports on the back of the machine, including an RS-232C port, printer port, back up power switch, CRT port, and a reset button. On the right side of the diagram–the left side of the computer when viewed from the front–the power switch, volume control, and telephone and modem ports are shown.

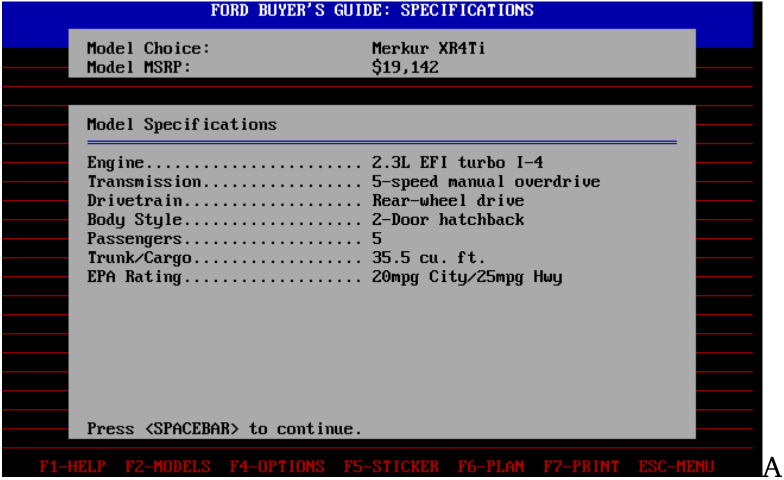
Andrew Czernek on the set of "Computer Chronicles." On the desk in front of him is a white Z-181 portable computer. The machine's screen is flipped open.



A black-and-white diagram of the Toshiba T1100 Plus. The LCD screen is flipped open, displaying the keyboard underneath.There are two 3.5 inch disk drives stacked on the right side of the machine behind the screen.



The Toshiba T3100 computer on the set of “Computer Chronicles.” The machine has a gray color. The orange plasma display screen is open, revealing a keyboard underneath. The laptop is perched at a slight angle.



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FORD BUYER'S GUIDE: SPECIFICATIONS

Model Choice:                    Merkur XR4Ti
Model MSRP:                      $19,142

Model Specifications

Engine.......................... 2.3L EFI turbo I-4
Transmission.................... 5-speed manual overdrive
Drivetrain...................... Rear-wheel drive
Body Style...................... 2-Door hatchback
Passengers...................... 5
Trunk/Cargo..................... 35.5 cu. ft.
EPA Rating...................... 20mpg City/25mpg Hwy

Press <SPACEBAR> to continue.

F1-HELP  F2-MODELS  F4-OPTIONS  F5-STICKER  F6-PLAN  F7-PRINT  ESC-MENU
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A screenshot from “The Ford Simulator” listing the model specifications for a Ford Merkur XR4Ti priced at $19,142.

Chapter 5: The TRS-80 Model

102, NEC Multispeed, Zenith Z-181, Toshiba T3100, and the Dynamac

Unlike many people who cover computer history, I generally avoid talking about prices “adjusted for inflation” when discussing older products. For example, one of the products demonstrated in this next *Computer Chronicles* episode, the Zenith Z-181 portable computer, originally retailed for $2,399 in 1987. If you run that figure through an online inflation calculator, it will tell you that this is the equivalent of $5,395.60 in “purchasing power” in December 2022.

I see a couple of problems with talking about computer prices in these terms. First, a computer is not like a quart of milk or some other commodity that has remained relatively consistent in terms of quality over the years. The Z-181 had 640 KB or memory. The laptop I’m typing this post on right now–a roughly 10-year Dell Latitude E7240 that I paid about $250 for refurbished–has 8 GB. If you were to price both machines on a “per-kilobyte” basis, the old Dell is infinitely cheaper than the antique Zenith.

Second, stating the price of a computer in terms of relative purchasing power does not necessarily place it in the proper market context. On the surface, paying the 2022 equivalent of roughly $5,400 for a consumer laptop sounds ridiculous. Except that the Z-181 was not a consumer laptop. Indeed, most of the portable computers we’ll see in this episode were targeted at a market largely composed of big business and government customers. There was no “consumer laptop” market to speak of in 1987.

Put another way, nobody was buying the equivalent of a $200 Chromebook during this period. The closest modern equivalent of a Z-181 in terms of market positioning may be something like a MacBook Pro, where a 16-inch model can set you back around $2,399–or what a similarly situated customer would have paid for the Z-181 back in 1987.

Fully Functional Portables Swept Away the Old Remnants

Stewart Cheifet opened this episode with his customary show-and-tell, holding a Convergent Technologies Workslate (see below), an early portable computer. Cheifet noted the machine came about four years ago and was already considered an antique. It was the “old remnant” of what laptops used to be, i.e., a machine with a small, hard-to-read display.

Cheifet said that while laptops once struggled to make a dent in the market, today everybody was trying to buy them, leading to shortages in some places. What had changed? Kildall said the key was that laptops now had “full functionality.” People were spoiled by using modern AT-compatibles with a nice keyboard in their offices. Now you could buy a portable with a good, readable display and a hard disk system. This made it possible to use a laptop in a situation like an airplane ride.

Portables as “Genuine Alternatives” for Business Travelers

Wendy Woods presented her first report, which she narrated over some B-roll footage of a Chevron Company traveling salesman, Joe Dennison, going about his work. Woods said that taking a computer on the road was not for everyone. But many business travelers like Dennison were discovering the practical side to carrying a portable machine.

Dennison sold fertilizer chemicals for Chevron throughout central California, Woods explained. He’d been carrying a Hewlett-Packard Portable 110 for over two years. At his hotel, he could prepare sales reports and keep track of his appointments. Through a modem connection, he could get account information from his office’s mainframe.

Woods said that Dennison spent several days at a time in rural areas, but his office traveled with him, so long as he could find an outlet and a telephone. He even took his HP Portable to visit clients on sales calls. This was no more cumbersome than carrying a case full of binders–and the computer could hold far more information.

The HP Portable came with software built into a ROM chip. But Dennison also carried a disk drive and a printer to make hard copies of documents. If he was unable to answer a customer's question, he could call up Chevron's database and retrieve up-to-the-minute pricing and stock (inventory) information.

One of the most common problems faced by business travelers, Woods said, was communicating with other co-workers, who may themselves be on the road or simply hard to reach. The solution to that problem was electronic mail, a common mailbox where Dennison could receive and transmit messages when convenient.

Woods added that portable computers had yet to achieve the popularity originally predicted by industry analysts. But with legible screens, lighter weight, and some serious software, portables were now becoming genuine alternatives.

NEC Offered Two Speeds with a Supertwist

Bob Wade and James D. Bartlett joined Cheifet and Kildall for the first studio round table. Wade was a marketing manager with Tandy/Radio Shack. Bartlett was a marketing manager with NEC Home Electronics.

Wade was there to discuss the TRS-80 Model 102 (see below), the most recent update to the Model 100 line of portable computers. Kildall noted that Tandy had sold about 250,000 machines in the 100 line over the past six years, so Wade probably had a good idea of their customer profile. Wade said the largest group of Model 100/102 users were professional journalists. Virtually all major newspapers in the United States and around the world used the Model 102 for remote data transmission back to the home offices for publication.

Kildall asked if that was how the machine was originally conceived. Wade said the original thought on the 100 line was to build a machine that could be used to retrieve data in the field and then transmit it back to the home office.

Cheifet said the main features of the Model 100 were that it was very light and portable. He added that Tandy now also offered a cellular telephone option with the machine. Taking his cue, Wade pulled out a giant cellular telephone from under the desk (see below), which explained could be connected to the 102. He said police departments throughout the United States were now experimenting using this setup to transmit data from the field to their local station's database.

Cheifet turned to Bartlett and asked about his company's product, the NEC Multispeed (see below). Bartlett said the Multispeed was an MS-DOS machine that was IBM PC compatible. NEC developed the Multispeed based on market research that showed people in the business world wanted an "expansion" or "supplement" to add to their desktop machine. NEC expected there would be a transition in the near future from desktops to portable machines that could provide a "no compromise" solution, i.e., a computer that performed as well as a desktop but that could be taken on the road.

Bartlett went on to explain that the Multispeed's display was a "supertwist" LCD, which he claimed was the "highest readability" technology on the market. The display was also detachable, so the user could still easily connect a color monitor behind the machine via an RGB port. The Multispeed also had a full-sized keyboard with a separate numeric keypad and function keys on the left side (similar to the Model F layout used on the IBM PC-AT keyboard). On the left side of the Multispeed was a connection for an optional 300- or 1200-baud Hayes-compatible modem. On the back there was a serial port, parallel port, RGB video port, external disk drive controller port, and various configuration switches.

Kildall pointed out the one thing that seemed to be missing from the Multispeed was a hard disk. He said that for a user like himself, it would be nice to have a 10 MB or 20 MB hard drive. Bartlett said the Multispeed came with two 720 KB floppy disk drives. NEC had thought about adding a 20 MB hard disk, but their market research indicated that portability and some degree of battery life–approximately 4 to 6 hours–was considered more important. To accomplish that with the Multispeed, a 16-bit machine running at either 4.77 or 9.54 MHz, meant that adding a hard disk would have effectively required the user to be 6 feet from an AC outlet and plugged in all the time.

Cheifet asked about the software included with the Multispeed. He noted that much like the TRS-80 Model 102, there was built-in software contained on ROM chips. There were also the previously mentioned floppy drives. How did that work in terms of carrying around software? Bartlett pulled off a cover on the bottom of the Multispeed, which showed the built-in ROM software chips. The ROM contained 512 KB of software including a notepad, filer, telephone dialer, and other productivity tools. Cheifet asked if you could use more “traditional” software like *Lotus 1-2-3*. Bartlett said you could buy such software on floppy disk and use it with the Multispeed. But he said third parties could also develop specialized applications for use with the ROM sockets, which could provide a “turnkey solution” for certain cases.

Cheifet asked about the price of the Multispeed. Bartlett said the suggested retail price was $1,995. Cheifet then asked about the “multispeed” nature of the machine–i.e., why did it need to run at both 4.77 and 9.54 MHz? Bartlett said most software was capable of running just fine at 4.77 MHz but some programs benefited from the higher 9.54 MHz speed. (For reference, the original IBM Personal Computer ran at 4.77 MHz.) By allowing the user to choose between the speeds, they could opt for the lower 4.77 MHz to help save on battery power.

To Backlight or Not to Backlight?

Andrew Czernek and Thomas Sherrard joined Cheifet and Kildall for the next segment. Czernek was a marketing director with Zenith Data Systems. Sherrard was a product marketing manager with Toshiba America.

Kildall opened by noting an early criticism of portable computers were the displays, which were difficult to read in poor lighting conditions, such as while sitting in an airplane. He asked Czernek what's changed in terms of display technology. Czernek said Zenith's own research confirmed that people had troubles even knowing whether or not the display was on with some older portable computers. Two things had changed with respect to Zenith's new portable computer, the Z-181. First, one of Zenith's engineers realized a few years ago that while an LCD may not be acceptable, you could put a light behind it and still have the machine work off of batteries. Second, LCD technology had advanced so that the screen could be readable from a side view, not just while looking directly at it.

Cheifet asked for a further explanation of the "supertwist" LCD technology mentioned in the prior segment. Czernek said supertwist was a technology that twists the crystals far enough so you could see them from the side as opposed to viewing the display within 10 degrees from center. Kildall asked about the backlighting and whether it was an important part of the technology. Czernek said he thought it was "mandatory."

Kildall asked if these new LCD screen portables were also using the CGA graphics standard. Czernek said the Z-181 used CGA but LCDs displayed information differently–specifically in blocks–so you didn't have spots appearing on the screen as you did with high-resolution monitors.

Cheifet asked Czernek for a "tour" of the Z-181 (see below). Czernek explained the machine had a cover that folded down and completely covered the keyboard. There was a full-size illuminated screen. There were two 3.5-inch floppy disk drives that "popped up" in the front from underneath the screen. On the side was a port to add a modem. On the back there was a serial port, parallel port, video connector, and an external floppy disk drive adapter. The Z-181 also came with 640 KB of RAM. Cheifet asked about the price. Czernek said the suggested retail price was

$2,399.

Cheifet then turned to Sherrard and asked about one of his company’s portables, the Toshiba T1100 Plus (see below). What was new and distinctive about this machine? Sherrard said the most important thing in a portable was portability, which meant minimizing size and weight. The T1100 Plus was just under 10 pounds (~4.5 kg) and about 1-foot square. This made it reasonable to carry.

Cheifet asked about Toshiba’s approach to the screen. Sherrard said it was also a supertwist LCD. It wasn’t backlit like the Z-181 but rather relied on a reflective technology. (If you’ve ever played an original Nintendo Game Boy, it’s that type of screen, albeit larger.) Sherrard conceded this meant you only got a good display when there was bright light.

Cheifet asked about the battery life on the T1100 Plus. Sherrard said the battery could run for about 8 hours. But if you used the disk drives or modem heavily you would obviously get less battery life. But he said for normal use, the battery would last a cross-country airplane flight or all day in an office environment.

Cheifet noted that both the Z-181 and the T1100 Plus used 3.5-inch microfloppy drives, which was now becoming the standard. But it was still a pain in the neck to get software, most of which was still sold on 5.25-inch floppy disks. Did either Czernek or Sherrard see that as a problem? Czernek said that by the end of 1987, he expected all software would be available in the 3.5-inch format. He said Zenith did a check back in June 1986 and found there were 75 major software packages available on 3.5-inch disks. Today that number was around 250 packages. So eventually the 3.5-inch disks would replace the 5.25-inch disks as they were cheaper, used less energy, and offered more design flexibility for hardware manufacturers in developing lighter portable machines.

Kildall asked if these types of portable computers might eventually replace the desktop machines. Czerkek said he was skeptical that would happen anytime soon, as desktop machines were much more flexible. For example, they had expansion slots and much higher display resolutions, as well as color. The desktop machines also had faster processors like the Intel 80386 and hard disk drives as large as 120 MB. As fast as portables moved up, desktops would move up and continue to outpace them.

Cheifet asked about the time to recharge a dead battery. Sherrard said it took about 6 hours to recharge the T1100 Plus using an AC adapter, and you could still use the machine during that time. Of course, it would charge more quickly if the machine was not in use. Czernek said the Z-181 had replaceable battery packs as an option. You could also purchase a high-speed charger that cut the battery charge time from 6 to 8 hours down to 3 to 4 hours.

GRiD Powered Nascent GPS Market

Wendy Woods presented her second remote report, which focused on the use of the GRiD portable computer. Woods said that whether flying in the sky, at sea, or on ground, portables like the GRiD were being used to accurately and quickly locate a geographical point on Earth.

Over some B-roll footage, Woods explained that Trimble Navigation manufactured an Earth station receiver and antenna that gathered data from satellites and fed it into a GRiD equipped with Trimble's software and recorded on floppy disk. The data was accurate up to 4 feet from anywhere on the globe.

Paul Perrault, a product marketing manager with Trimble Navigation, told Woods that the advantage of using a laptop computer was that the surveyor was able to take the data and process it in the field, so they know before going home whether the data was good. That was important to the surveying community because it was often very expensive to hire an entire crew.

Woods said that Trimble was the largest seller of computerized survey equipment. It had sold over 200 of their $40,000 GPS units and virtually all of their customers used them with GRiD. Altogether, GRiD said its machines were in use by more than 50

United States federal government agencies and more than 400 Fortune 1000 companies. And as portables became lighter and more powerful–like the new GRiD Lite–even more innovative applications for them would be found.

The First Portable Macintosh–and It Wasn’t From Apple

Britt Blaser joined Cheifet, Kildall, and Toshiba’s Thomas Sherrard for the final segment. Blaser was a vice president at Dynamac Computer Products.

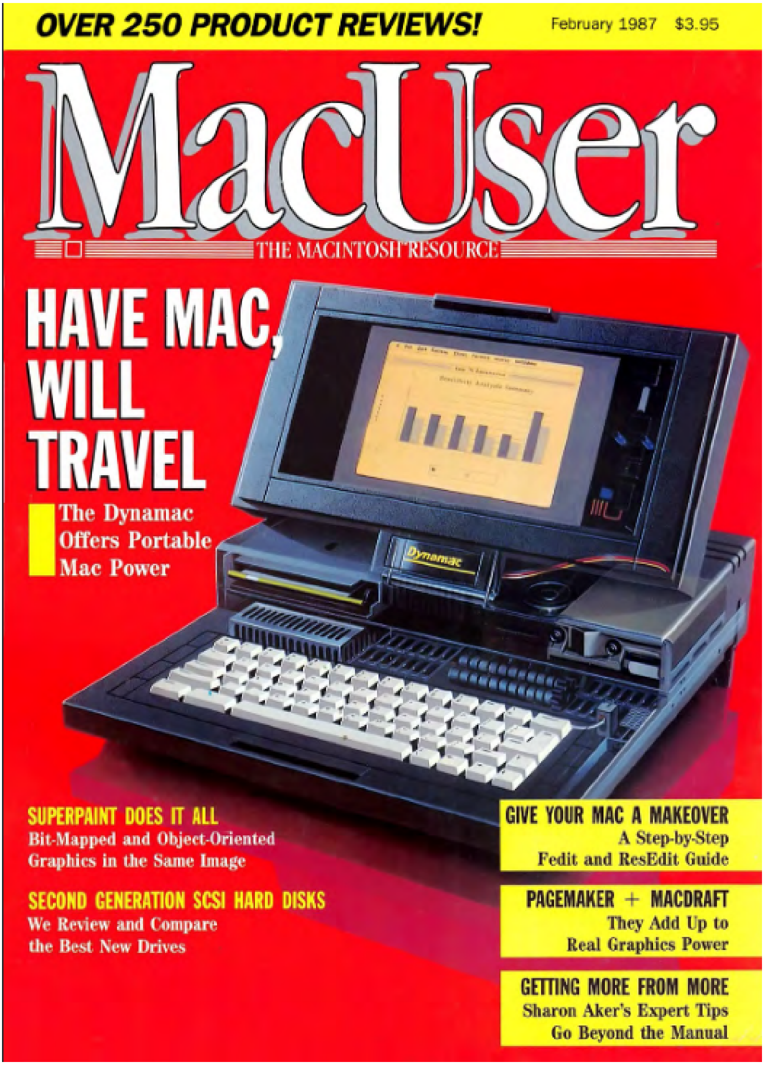
Kildall asked Sherrard about another new Toshiba portable, the T3100. This was a portable machine designed to run on AC power; there was no battery. Kildall wanted to know who was buying this type of machine. Sherrard said all kinds of people, including accountants, auditors, and consultants who needed to carry their machines to work. They had previously been lugging machines like the Compaq Portable, or they were keeping separate machines at home and at work. The T3100 allowed them to use a single machine as it could do almost anything that a PC-AT could do but in a portable package.

Kildall asked for more information about the T3100. Sherrard explained it was an AT-compatible with an Intel 80286 processor. It had a gas plasma display with a 640-by-400 resolution, which was double that of a typical CGA monitor. Much to Kildall’s pleasure, the T3100 also came with a built-in 10 MB hard disk drive in addition to a 720 KB, 3.5-inch floppy disk drive. The portable could also be connected to a separate chassis to accept IBM-compatible expansion cards.

Cheifet asked why Toshiba went with a gas plasma display for the T3100. Sherrard said it had a lot of desirable characteristics. The display was “very, very readable” and “extremely sharp.” The display made it possible to use applications that required high-resolution graphics such as desktop publishing. The display also put out light, which made it easier to read than an LCD. And since the machine didn’t run off of batteries, conserving power wasn't a problem.

Cheifet noted that hard disks were fragile and asked if a user should be concerned about using a portable with a built-in hard drive. Sherrard said that shouldn't be a concern, as the T3100's hard disk was engineered specifically for portable applications. It was intended to take some "hard knocks."

Cheifet noted the T3100 was the first portable AT machine. He then turned to Blaser, who was offering the first portable Macintosh, the Dynamac (see below). Blaser said the Dynamac took the same philosophy as the T3100. He said customers were responding in particular to the Dynamac's built-in 40 MB hard drive. (The original Macintosh did not come with a hard drive, although there were third-party modifications available.) Blaser claimed the Dynamac could take up to 75g of force when it wasn't operating and 10g when it was not. The Dynamac also came with 4 MB of memory and a built-in modem. On the demo unit, Blaser showed there were eight active applications–including *Microsoft Excel* and *MacDraw*–loaded into just 2.9 MB of RAM.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Cheifet asked if there were any compromises made in making the Mac portable. Blaser said no. In fact, the Dynamac extended the Macintosh's capabilities. Blaser then showed that the back of the Dynamac contained the same ports as a regular Macintosh, since it used the same motherboard.

Cheifet asked about the audience for the Dynamac given the machine was portable but, like the Toshiba T3100, only ran on AC power and not a battery. Blaser said one target customer would be a journalist who might not want to record things on-site but would use a Dynamac to edit copy downloaded from a TRS-80 Model 102. Other potential customers included field workers and auditors. Again, Blaser emphasized the value of the built-in 40 MB hard drive. And the Dynamac could also be configured to work with an external keyboard, keypad, and monitor. Cheifet asked if the Dynamac would be useful for desktop publishing. Blaser said absolutely. He added that the production version of the Dynamac–as opposed to the demo unit he had in the studio–would have an electroluminescent display with the same 640-by-400 resolution as the T3100.

Reiterating a question from the prior segment, Kildall asked Blaser for his view on portables possibly replacing desktop machines. Blaser said that was the idea behind the Dynamac–to have a “jerk-and-run machine” that you could unplug and take with you. The hard disk made that possible. He added there was also an external adapter available to run the Dynamac on a battery.

Cheifet asked about what we could expect in the development of laptops over the next couple of years. Sherrard said he expected more of the same–i.e., more disk storage, more speed, more memory, and lighter weight for the same kind of capabilities. Blaser added there would be further innovation with respect to non-volatile RAM and battery life.

Would the New Amiga be MS-DOS Compatible?

Stewart Cheifet presented this week’s “Random Access,” which was recorded in February 1987.

- There were rumors that the new Amiga 2000 would be capable of running MS-DOS software through an add-on board called the Amiga Bridge. Cheifet added the new Amiga would use a Motorola 68000 microprocessor coupled with a 68020 math coprocessor operating at 14 MHz. The base unit would sell for $1,500. Commodore was also expected to release a low-cost version of the original

Amiga 1000 for around $600.

- Hewlett-Packard announced two new versions of its LaserJet printer: The LaserJet Series II Plus, a less-expensive version of the LaserJet Plus for around $3,000; and the high-end LaserJet 2000. Cheifet said analysts predicted laser printer sales overall would double in 1987 to more than $1 billion.
- The U.S. Coast Guard Academy became the 18th American college to require freshmen to buy personal computers, joining the ranks of the other U.S. military service academies. Cheifet said the Coast Guard Academy picked the Macintosh as its required computer.
- Ricks College in Idaho and Brigham Young University in Utah were the first schools to implement online class registration systems. Cheifet noted that even if students didn't have a computer, they could still access the system via touch-tone phone.
- Paul Schindler reviewed *The Ford Simulator* (Beck-Tech, Free), an advertisement for the Ford Merkur XR4Ti distributed on floppy disk.

- *BusinessWeek* magazine recently released *Mutual Fund Scoreboard*, a $49.95 floppy disk program that helped users select between 550 mutual funds.
- Another new program, *Appetite for Business*, offered a database of good restaurants in major American cities. Cheifet said the database would also be available as an online service beginning in June 1987.
- A Boston telephone company created an "online telephone pub" that charged users 10 cents per minute to participate in multi-user telephone conversations.
- A Chicago lawyer proposed creating an online law practice.

The Saga of Zenith Data Systems

Zenith Data Systems (ZDS) is a company we've seen before on *Computer Chronicles*. Prior to this episode, ZDS president Bob Dilworth–formerly of Morrow Designs–joined Cheifet and Kildall to discuss the Zenith Z-386 desktop PC at the end of 1986. Of course, Zenith's Z-171 portable computer was based on the Morrow Pivot II, a design that ZDS had initially licensed and later acquired after Morrow Designs went bankrupt in 1986.

As far as I know, the Z-181 demonstrated in this episode had nothing to do with Morrow's Z-171 design. One key difference between the two machines was that the 171 still used a 5.25-inch floppy disk drive while the 181 featured the signature "pop up" dual 3.25-inch drives.

From Airplane Kits to Home Electronics Kits

But let's turn to the history of Zenith Data Systems itself. The company actually has its roots in two companies that were separately founded in Chicago. The first was Chicago Radio Labs. Founded by Ralph Matthews and Karl Hassel in 1918, Chicago Radio Labs initially marketed amateur radio equipment. In 1923, the business was renamed Zenith Radio Company and started selling "portable" radios–i.e., pre-assembled radios that could be physically moved, much like the portable computers in this episode. Zenith later transitioned into the television and broader consumer electronics business.

The second company was the Heath Company, which was started by Edward B. Heath in 1909. Originally known as the E.B. Heath Aerial Vehicle Company, Heath started out by manufacturing and selling aircraft parts to individuals who were building their own planes. In 1926, Heath and Claire Lindstedt developed the Parsol, a "single seat, high-wing monoplane with a low-cost, 23-horsepower Henderson motorcycle engine," according to *The Museum of Flight*. Customers could purchase the plane fully constructed and ready-to-go for $975. Alternatively, they could buy a "kit" with the blueprints and unassembled parts for $199. Heath Co. ended up selling far more of the kits, about 1,000 in all.

Edward Heath himself died in February 1931. He was solo testing a new plane design–the Heath B-4–when one of the wing struts collapsed and he crashed into a farm just outside of Morton Grove, Illinois. The farmer witnessed the accident and pulled Heath's body from the wreckage.

Heath's mother inherited the E.B. Heath Aerial Vehicle Company after her son's death. She sold the business to two brothers, John and Walter Clinnin, in May 1931. The Clinnins then relocated the company from Chicago to Niles, Michigan, and changed its name to the International Aircraft Corporation (IAC).

IAC didn't last long. The Clinnin brothers filed for bankruptcy in 1934. Howard E. Anthony then purchased IAC's assets at auction for $300. Anthony was an amateur aviator himself, having previously built one of Edward Heath's Parasol plane kits back in the 1920s. Shortly after buying the company, Anthony married John Clinnin's secretary, Helen Ballard, and the newlyweds rebuilt the business, which they renamed Heath Aircraft Company.

It was towards the end of World War II that Heath entered what became its most famous business–selling electronics kits. Heath initially bought up surplus electronic components left over from the war and repackaged them into what became known as "Heathkits." The first Heathkits included parts to build an oscilloscope, which were later followed by amateur radio kits.

Sadly, Howard Anthony's tenure with his newly successful company ended abruptly in July 1954. Like Edward Heath, Anthony died in a plane crash. Anthony and five others were killed when their twin-engine De Havilland Dove plane crashed into a mountain outside of Dayton, Tennessee.

Following her husband's death, Helen Anthony sold Heath Co. to New Jersey-based Daystrom, Inc., for $1.85 million in February 1955. Daystrom was a budding industrial conglomerate that was primarily interested in Heath's electronics business. Now a Daystrom subsidiary, Heath built a new headquarters and plant in St. Joseph, Michigan, in 1957 at a cost of around $2 million.

Adding an additional layer of corporate bureaucracy, Schlumberger Limited, a Houston-based oil and gas services company, acquired Daystrom in a stock swap in January 1962. Schlumberger had no interest in Heath or the electronics kit business. Rather, Schlumberger wanted to get its hands on another Daystrom subsidiary, Weston Electrical Instrument Corporation, which made instruments that were used in the oil and gas business. But Heath was profitable, so Schlumberger basically left it alone.

Zenith Turned Heathkits Into PCs for Government Buyers

Fast forward to 1977, and Heath Co. decided to extend its electronics kit business into the growing field of microcomputers. Starting in June 1977, Heath Co. sold a $375 small computer kit targeting hobbyists, and an assembled $1,195 computer targeting the business market.

Heath's success with the Heathkit computers drew the attention of Zenith Radio Corporation. By this time, Zenith's main business was manufacturing and selling television sets. But the American television industry was struggling against competition from Japanese manufacturers. Zenith management therefore decided that they needed to diversify and microcomputers would be a good area for expansion.

As it turned out, Schlumberger was in the process of acquiring Fairchild Semiconductor in 1979. This apparently prompted some antitrust concerns given that Fairchild was also in the consumer electronics business–they produced the Channel F, an early video game console, among other things–so in July 1979, Schulmberger sold Heath to Zenith Radio Corporation for $64.5 million in cash. That October, Zenith created a new subsidiary known as Zenith Data Systems, which took over the manufacturing of assembled microcomputer products. The original Heath Co. would continue to sell its Heathkits. Zenith also created Veritechnology to serve as its retail arm. ZDS, Heath, and Veritechnology were collectively known as the Zenith Computer Group.

By the time ZDS introduced the Z-181 in June 1986, the company was a leading seller of personal computers, albeit not at the consumer level. ZDS machines were mostly sold to government and business customers. As I detailed in my prior post on Morrow Designs, the Z-171 famously won ZDS a major contract with the Internal Revenue Service, beating out the IBM PC Convertible among other bids. The Z-181, in turn, was prompted by ZDS management's concern that the Convertible could still pose a substantial competitive threat to other potential contracts.

Of course, ZDS was also concerned by its Japanese competition, including Toshiba's T1100 Plus and T3100 portables. This led to a political showdown in 1987 that began not longer after the companies' sales representatives appeared together on *Chronicles*. In March 1987, U.S. President Ronald Reagan imposed 100 percent tariffs on various Japanese exports, including laptop computers. This was prompted by a longstanding belief by the Reagan administration and congressional leaders that Japanese semiconductor companies had unfairly "dumped" inexpensive computer chips into the United States market to undercut domestic manufacturers.

Naturally, ZDS was thrilled with the tariffs. The parent company, which had changed its name from Zenith Radio Company to Zenith Electronics Corporation in 1984, had spent over a decade pursuing an unsuccessful antitrust lawsuit against a number of Japanese television manufacturers, including Toshiba, accusing them of colluding with Japan's government to destroy to the U.S. domestic television production market.

On a practical level, the tariffs made Toshiba's laptops politically and financially untenable when it came to U.S. government contracts. In August 1987, ZDS beat out Toshiba for a 90,000-laptop contract with the U.S. Air Force valued at around $105 million. (The contract was for the Z-184, which was similar to the 181 but did not have the pop-up disk drives.) Toshiba lost out not just because of the tariffs, but also because of a scandal involving one of the company's subsidiaries allegedly selling submarine technology to the Soviet Union.

It should be noted here that while anti-Japanese bigotry helped fuel ZDS' success in this time period, many of Zenith's laptops were also manufactured in Japan. According to *NewsBytes*, most of the 90,000 computers used to fill that Air Force order were actually manufactured by Osaka-based Sanyo Corporation under an OEM license from ZDS. Zenith officials said they did their manufacturing in Japan largely because that's where the good laptop screens were made.

ZDS Disappeared in 1990s PC Consolidation Wave

Zenith Data Systems continued to enjoy success well into the late 1980s. Indeed, from the parent company's standpoint the computers were doing far better than the television sets. Eventually, Zenith Electronics Corporation management decided it needed to double down on its core business and raise capital to invest in new television technology. Accordingly, in December 1989 Zenith sold the entire Zenith Computer Group, which included ZDS and the original Heath Co., to Groupe Bull for $495.4 million in cash.

Groupe Bull is a French computer company whose own history dates back to 1931. Bull had passed through a number of owners–including General Electric and Honeywell–before it was nationalized by the French government in 1982. Zenith Data Systems continued to produce computers under its own name even after the Bull acquisition.

But Groupe Bull had its own financial struggles. In October 1993, the French government invested an additional $1.2 billion in the company. The previous year, French Prime Minister Edith Cresson negotiated a deal where IBM purchased a 5.7 percent stake in Bull. Another company featured in this *Chronicles* episode, Japan's NEC, also purchased a 4.4 percent interest.

Just a couple of years later, in February 1996, Groupe Bull sold Zenith Data Systems to Packard Bell, which at that time was the second-largest U.S. seller of PCs. The $650 million deal included a $387 million payment to Bull and a $283 investment from NEC, which not only still owned a stake in NEC–which was now 17 percent–but also owned 20 percent of Packard Bell.

Packard Bell moved into first place in the U.S. market following the acquisition, but the victory was bittersweet for Zenith Data

Systems. Packard Bell closed the ZDS production facility in St. Joseph, Michigan, in July 1996 and combined the remaining ZDS operations into Packard Bell's offices in California. (Groupe Bull continued to own the St. Joseph facility up until 1999.) Packard Bell retired the Zenith Data Systems name in the United States in October 1997, although it continued to be used in Europe for a time. Packard Bell itself was acquired by its minority shareholder, NEC, in June 1996 in a $300 million deal that formed Packard Bell NEC. That company pulled out of the U.S. personal computer market at the end of 1999.

As a final note, the ZDS sale to Packard Bell did not include the original Heath Co. Zenith was never that interested in the Heathkit business and ended development of new kits around 1986. Production of Heathkits ceased altogether in 1992. In October 1991, ZDS reached a draft agreement with a venture capital firm interested in buying Heath, but the deal fell through, which prompted litigation.

Groupe Bull would not sell Heath Co. until 1995. The ultimate purchaser was H.I.G. Capital, a Florida-based management company. H.I.G. ended up breaking up the remaining Heath businesses and selling them off piecemeal. Some of these "parts" were later reassembled into a new business entity called the Heath Company, which attempted to revive the Heathkit business as late as 2022.

Notes From the Random Access File

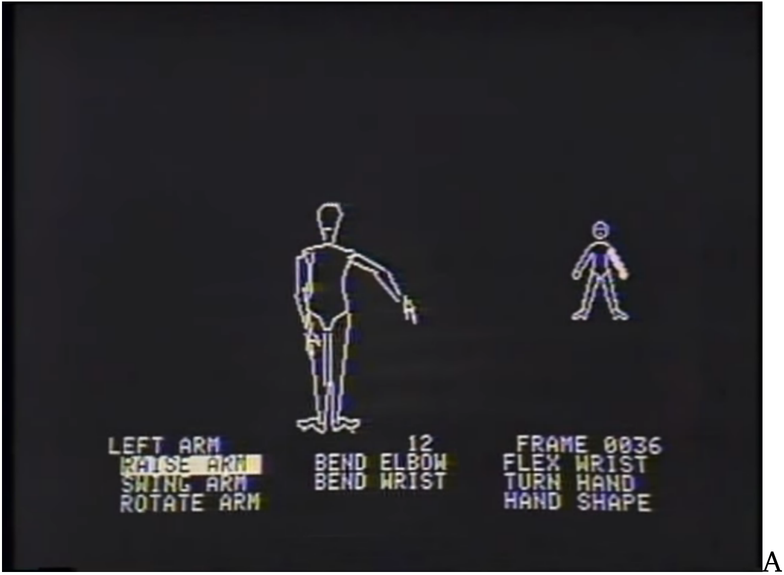
- This episode is available at the Internet Archive and has an original date of February 26, 1987.
- Andrew Czernek was a vice president with Zenith Data Systems from 1981 to 1991. He later worked for Phoenix Technologies and Google. His last reported position was with Lionbridge Technologies in 2008.
- Britt Blaser was a U.S. Air Force combat pilot during the Vietnam War. He was an early investor in Dynamac Computer Products and later served as its CEO. The Dynamac itself made its debut as a prototype in August 1986. As I discussed in an earlier post, the Dynamac was

not a Macintosh clone. Dynamac purchased original Macintosh Plus units at a slight discount from Apple and reused those parts to construct its machines. Dyanamac continued in business until 1992. During the 2000s, Blaser shifted his attention to politics, serving as an adviser to former Vermont Governor Howard Dean's 2004 presidential campaign and later starting the NewGov Foundation and the League of Technical Voters.

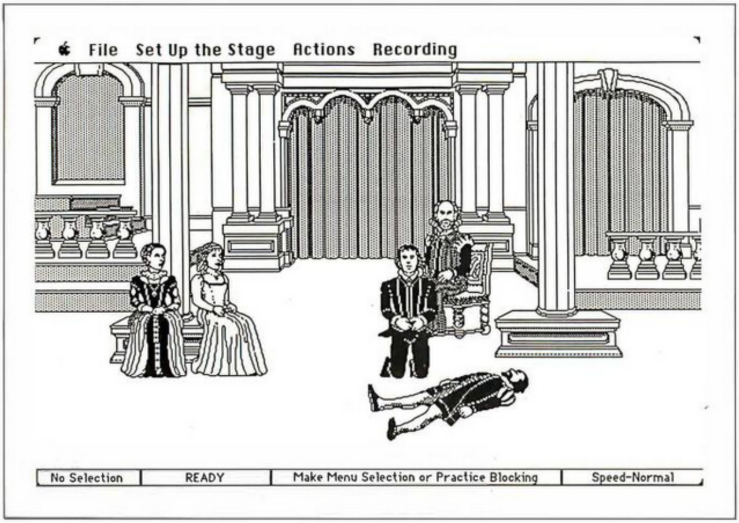
- Stewart Cheifet recorded his cold open from a Cathay Pacific check-in desk, presumably at San Francisco International Airport. Based on the signage, it looks like he was waiting for a flight to Hong Kong to record his remote segments for the previous episode on intelligent buildings.
- The Amiga 2000 did launch in March 1987 in Europe and offered the "Amiga Bridgeboard" as an optional accessory to run IBM PC and MS-DOS software. David L. Farquhar published a blog post in 2020 detailing the Bridgeboard. As for the low-cost Amiga, that would be the Amiga 500, which also launched initially in Europe for $649.
- One reason the Coast Guard Academy selected the Macintosh as its mandatory computer might have been its networking capabilities. According to *NewsBytes*, the academy's computers were all linked to a mainframe at Dartmouth University in New Hampshire. *NewsBytes* also pointed out that while a Macintosh may have been an expensive required purchase in 1987, Coast Guard Academy students did receive free tuition, room, and board, as well as a $494.40 monthly stipend to defray expenses.
- *The Ford Simulator* reviewed by Paul Schindler was the first in a series of disk-based advertisements for the famous car brand. Clint Basinger of the YouTube channel LGR reviewed the second and seventh entries in the series, with the latter published on CD-ROM in 1996.
- Heath Co. didn't just make computer kits. They also made robots, notably the Hero-1, which was demonstrated in-studio on an early *Computer Chronicles* episode that I covered.
- Special thanks to Erich E. Breuschke, KC9ACE, and Michael Mack for their 2019 paper, "The History of the

Heath Companies and Heathkits: 1909 to 2019," published in *The AWA Review*, which helped me fill in some of the gaps regarding the history of Heath Co.

A shirtless man dancing with a giant robotic arm in an auto garage.



A screenshot from “DOM” running on an Apple IIc. There are two line drawings of human figures on the screen. Below the figures is a menu listing various program options, such as “RAISE ARM.”



A screenshot from “TheaterGame” running on the Macintosh. There is a black-and-white illustration of four actors seated around a stage. A fifth actor is lying on the ground.

Chapter 6: Invisible Cities, DOM, TheaterGame, and Terpsichore

The topic of “computers and the arts” today largely focuses on the use of artificial intelligence to suck up the work of artists–often without their permission–and regurgitate it based on text prompts. No doubt the goal of many of these venture capital-funded projects is to eventually replace the human artists altogether.

Such concerns were still more science fiction than dystopian reality back in March 1987, when this next *Computer Chronicles* episode first aired. But the ever-wise George Morrow nevertheless cautioned that we should always ensure that machines serve the humans, not the other way around. Stewart Cheifet opened the program by showing Morrow, this week’s co-host, a series of black-and-white sketches produced by artist

Harold Cohen using a plotter hooked up to a computer. Cheifet noted that some artists believed computers and art didn't mix. What did Morrow think? Morrow disagreed. He thought that critics of using computers in the arts were getting the hardware mixed up with the software. He cited the film *Star Wars* as an example of artists creating effects with software. In art, there were a lot of repetitive tasks. Computers could be a marvelous tool for helping automate those tasks–provided the software was made by the artists and not some computer scientist.

"Now I've Had the Time of My Life…"

Wendy Woods presented her first remote report, which focused on *Invisible Cities*, a ballet that featured both human dancers and giant robotic arms. Woods said this performance was an example of the new collaboration between the human dancer and increasingly human robots. The programmer for this piece was Dr. Margo Apostolos, a professor and director of the dance department at the University of Southern California, who first got the idea from watching a robot used in a veterans hospital research project. Apostolos said when she first saw that robot at Stanford University, she was curious to see if something that was mechanical and very staccato and linear in its actions could be made to move "beautifully."

Woods said that Apostolos had since produced several robotic dance works of her own (see below), some with and some without human partners. Apostolos discovered that robots could make a lasting impression. She said the response had been mixed in that the critics who saw the *Invisible Cities* performance in San Francisco felt the robots actually upstaged the dancers.

Another artist intrigued by robotic movement, Woods said, was Pamela Green of Stanford University. Her piece, *Animal, Vegetable, or Mineral*, began as a costuming project. Green said the form was moving and it reminded her of an animal form, particularly a bird. So she asked herself, "What if these things were really to be birds?" And then she tried that out in an experiment and it proved to be "too simple."

Woods explained that Green's work was for a single robot arm programmed to move within an interactive environment. *Animal, Vegetable, or Mineral* was only about eight minutes long. But it took a month of programming to successfully choreograph. Green said she didn't want a passive robot with things happening to it. She wanted to explore what it was that gave something a spirit of animation, i.e., at what point was something "animal, vegetable, or mineral"?

A Dancing Word Processor

Eddie Dombrower joined Cheifet and Morrow for the first round table. Dombrower was president of Dom Dance Press, which developed a software program for choreographers known as *DOM*.

Morrow asked Dombrower for some personal background and how he came to write *DOM*. Dombrower said he studied both dance and computers in college. After graduating in 1980, he received a grant to go to England and study computers and choreography. At that time there wasn't a whole lot being done in the field, especially not on small, portable computers. So he worked on using computer animation of human figures to represent dance notation. Cheifet noted this was easier than trying to describe dance notation in words. Dombrower agreed.

Dombrower then provided a demonstration using *DOM* running on an Apple IIc (see below). Dombrower explained the software's editing system. You could move parts of the human figures by using menu-driven commands working in conjunction with the arrow keys. For example, you could select "Raise Arm" and then use the arrow keys to move the arm into a specific position. Dombrower noted that he was also working on a product for Electronic Arts, *Earl Weaver Baseball,* that used this same basic system to do character animation.

Morrow observed that when you finished with the character animation in *DOM,* you ended up with a dance sequence. Dombrower said that was correct. You saved each individual frame and then moved onto the next frame. Cheifet noted that

DOM was effectively a “dancing word processor.” Dombrower agreed.

Morrow asked if *DOM* could be used by both choreographers and dancers. Dombrower said it could be used by choreographers or teachers, but mostly it was a tool for dancers to learn things that weren’t accessible because of their location.

Dombrower then showed a completed dance animation sequence, an “introduction dance” that included a “pedestrian move,” i.e., a walking animation, which he said was one of the more difficult things to notate. In this mode, *DOM* was akin to a video recorder. The user could play the entire animation or freeze frames. You could also rotate the figure to see the dance sequence from a rear angle. Morrow observed this made *DOM* even more flexible than a video tape. Dombrower said you could also edit the sequence to accommodate a less advanced dancer. The dancer could also repeat small sections of the animation over and over to learn a particular sequence or step.

Morrow asked about the feedback Dombrower received for *DOM*. Dombrower said the software was currently out on 15 beta testing sites, mostly teachers and universities, and he’d received very positive feedback. Morrow enthused this was an example of what he was talking about earlier–an artistic professional creating a program. Dombrower then concluded the segment by running another demo he created on *DOM* of a breakdancing routine.

The Play’s the Thing…

Charles Kerns and Larry Friedlander joined Cheifet and Morrow for the next segment. Both guests worked at Stanford University where they created *TheaterGame*, the subject of the next demonstration.

Morrow asked Kerns, a project leader with Stanford’s IRIS program, about his work. Kerns explained that IRIS was part of Stanford’s academic computing program and one of its projects was working with faculty members to develop instructional courseware. *TheaterGame* was one example of this. Morrow clarified that IRIS was a resource for people who weren't necessarily computer literate. Kerns said that was correct. IRIS supplied equipment and programming expertise.

Morrow asked Friedlander to describe *TheaterGame* itself. Friedlander said the software was designed to help students with no theatrical background or access to a physical stage–only the text of a play–develop their imaginations for staging and spatial relationships. So when students read the play they could also help create the scene.

Friendlander showed an example of this staging using *TheaterGame*, which ran on a Macintosh Plus (see below). This was a scene from William Shakespeare's *Hamlet*. In this scene–Act III, Scene 1, for you Shakespeare fans out there–Friedlander explained, Hamlet and Ophelia were attempting to reconcile. The software animated the characters along with the text of the play. The student would start by picking the stage and actors and props. Morrow said *TheaterGame* could therefore be used to actually give students an assignment to create this scene. Friedlander said that was correct. The student basically had to make all of the important decisions that a director or actor would make.

Friedlander continued to demonstrate the program's features. Individual actors could be moved into one of four positions–standing, sitting, kneeling, or lying down. You could also move just the actor's head. Morrow observed this wasn't icon-driven so much as positional-driven without having to use the keyboard. Frielander said that was correct. Kerns had developed the program so that you only needed to use the mouse and click on a character to move them.

Morrow asked about the division of labor in making *TheaterGame*. Friedlander said Kerns did the actual programming. But Friedlander was essentially the designer. There was also a graphic designer, Marge Boots, who worked with the Macintosh regularly.

Cheifet asked Friedlander if *TheaterGame* was something that could actually be used by a director for, say, blocking out a play. Friedlander said it could be useful for a large scene where the director had to manipulate a lot of characters and work out the “traffic” beforehand. Morrow said taken to its logical conclusion, the software could be used to handle rehearsals. Friedlander said it could record everything that happened at a rehearsal. Right now, it was common practice for a stagehand to write all that information down by hand.

Photons Be Free!

Wendy Woods returned for her second report, which focused on a computer-based form of art, holography. Woods noted that television was a 2D medium, so the viewer couldn’t see what she was looking at: a stunning, moving 3D image. Holographic artist Sharon McCormack made these images by first capturing computer graphics on film. The process of transferring these images to holographic film was tedious and exacting, and for that job McCormack used an Apple II. The microcomputer drove the optical printer that made the holograms. (Based on the screenshot, the software was “Hologram Printer 2.1.”) The software controlled exposure time, running time, the stability of the optical printer, and the ratio of the two laser beams used to create the hologram. McCormack told Woods that because of the computer, she was able to input all of the different parameters for making a hologram from a keyboard.

Woods added that the original design was also created on a computer. Just a few years ago, creation of a rotating, textured image required the power of a Cray supercomputer. Today, it could be done on a small graphics workstation. McCormack said that with the computer, she could have whatever surface she wanted. She could change the scale or perspective. She could choose the “lens” in the computer without having to carve anything out.

Woods added that a new technique called “embossing” was being developed to put holograms directly onto non-photographic surfaces, such as paper, which would give the technology much greater exposure.

Recreating the Renaissance on a Macintosh

John Burke and Stacy McKee Mitchell joined Cheifet and Morrow for the final segment. Burke was a conservator with the Oakland Museum of California. Mitchell was CEO of Great Wave Software.

Morrow opened by noting it wasn't obvious how a museum conservator used software in their work. Burke explained his role was to take care of the objects in the museum, including restoring and conserving them. Documentation was very important to that work. A conservator needed to know the condition of an object at all times, e.g., what was done to it, what had been done to it, and so forth.

Burke explained that he used off-the-shelf software–*Microsoft File* in conjunction with *MacVision*–to keep a picture of the objects that he worked on. He showed a selection from his conservation database, which was made in *File* on the Macintosh. When you selected an item from the database it pulled up a digitized picture of the art object. The digitized image could then show what part of the object was damaged or needed work, which Burke said was much easier than trying to explain it in words. The *MacVision* digitizer worked with both 2D and 3D objects, he added.

Cheifet then turned to Mitchell and asked about her company's software, *Terpsichore*, which focused on music rather than physical art objects. Mitchell said the original *Terpsichore* was a collection of 312 instrumental dances compiled by German composer Michael Praetorius and first published in 1612. (The name "Terpsichore" refers to the ancient Greek goddess of dance.) The *Terpsichore* computer program by Richard Ray was a subset of 181 of those 312 compositions on floppy disk, including the digitized Renaissance instruments necessary to play them.

Mitchell went on to explain that *Terpsichore* was an add-on to another Great Wave music software program, *ConcertWare Plus*. She added that 80 percent of the music on *Terpsichore* had never been published in auditory form before, only as written compositions. Morrow noted that many of the Renaissance instruments were also not readily available today. Mitchell reiterated that the software recreated the sounds of those instruments.

Mitchell then ran *Terpsichore* on a Macintosh Plus in conjunction with a Casio CZ-101 synthesizer that communicated via a MIDI interface. The software played one of the Praetorius tracks, *Ballet de la Royne*, which included eight instruments: a Rackett, a Recorder, a Krummhorn, a Viola da Gamba, a Regal, a lute, a Bombarde, and a true harpsichord.

Morrow asked how many instruments could be played at one time. Mitchell said it depended on the synthesizer. The Casio CZ-101 could play only four at a time. But the software could support up to eight instruments. Some Yamaha synthesizers could support all eight at once.

Cheifet asked about the market or application for *Terpsichore*. Mitchell said the primary audience was Renaissance music enthusiasts. Some of the universities also used it for their early music programs. Cheifet asked about the unique contributions offered by the computer. Mitchell said the computer was able to record something that previously could not be recorded because the original instruments were no longer available in large quantities.

Turning back to Burke, Cheifet asked if he'd ever considered designing software to handle his conservation work as opposed to using off-the-shelf software. Burke said yes, his museum had been talking about doing documentation using artificial intelligence to help figure out where damage existed on a particular art object. That would make it possible for a number of people to do something that right now required an expert.

Apple Cut Prices as SE/30 Launched

Cynthia Steele presented this week's "Random Access." The episode available from the Internet Archive is a rerun of the original March 1987 episode. So this news segment was from

January 1989.

- Apple announced price cuts for its Macintosh line. The price of a Macintosh SE with a 40 MB hard drive was now $4,369 (down 14 percent). The Macintosh II with the same hard drive was now $7,369 (down 9 percent). And the Macintosh IIx with an 80 MB hard drive was now $7,869 (down 16 percent).
- The new Macintosh SE/30 had received generally good reviews. Steele noted the SE/30 had a different expansion slot architecture than the original SE. This meant the SE/30 could use cards designed for the Macintosh II but not the original SE.
- Jasmine Technologies announced a new erasable optical disk drive. Steele said the new unit was a 5.25-inch drive with a 600 MB capacity and an average seek time of 50 milliseconds. The price was under $5,000.
- Verbatim announced its own 3.5-inch erasable optical drive with a claimed average access time of 30 milliseconds. Steele said there was no word on price or shipping date.
- Unisys introduced what it was calling the first “desktop mainframe,” the Micro A, which would be capable of running MS-DOS programs.
- Lotus Development Corporation unveiled its new hard disk management program *Magellan,* which allowed users to search by keywords and combine files or portions of files. Steele said *Magellan* would ship in April 1989 for a list price of $195.
- Lotus also reported that its fourth-quarter 1988 earnings were down 60 percent–from $23 million to $9 million–from the same period in 1987.
- Hungarian game designer Ernő Rubik said he would not license his puzzles, including the classic Rubik’s Cube, to any computer game publishers.

Bringing Theater to the People

Larry Friedlander has been associated with Stanford University for nearly 60 years. Friedlander spent most of his career as an

English professor. And as this episode illustrated, he has often been at the forefront of embracing new methods of bringing theatrical experiences to the public.

For example, in 1969 Friedlander advised an undergraduate student drama group that would stage free “community theater” performances inside Stanford dorms. He also planted “spontaneous actors” in his contemporary drama courses to intentionally stage disruptions while he lectured. A year later, in 1970, Friedlander spent six weeks touring small towns in seven states where he and three colleagues produced a variety of “dance, poetry, mime, lectures, and folk songs” for local audiences, according to the *Palo Alto Times*.

Fast forward to the mid-1980s and Friedlander told the *San Francisco Examiner* that he got the idea for what became *TheaterGame* while teaching a course “that stressed the performance aspect of Shakespeare’s plays.” Friedlander approached Stanford’s Faculty Author Development program, where Charles Kerns worked. Kerns was then assigned the task of turning Friedlander’s concept of helping students visualize the text of *Hamlet* into *TheaterGame*.

The development process took about two years, according to Kerns. He told the *Examiner* The most difficult part was “creating a design that would let the student control the characters” in a manner that was “as simple as driving a car.”

TheaterGame was distributed commercially, at least on a limited basis. The *Examiner* said the program was available for $25 at a Kinko’s store in Berkeley, California. Friedlander and Kerns also discussed incorporating *TheaterGame* into a potential LaserDisc package that would include various clips from filmed versions of *Hamlet*, but I don’t think that ever came to fruition.

Kerns actually left Stanford in 1989 to join Apple for several years as a senior research scientist with the Apple Classroom of Tomorrow project. He returned to Stanford in 1999 as associate director for the school’s Learning Laboratory and remained with the university until he retired in the mid-2010s. Starting in 2011, Kerns authored a series of mystery novels known as the Oxaca

Mysteries.

Notes from the Random Access File

- This episode is available at the Internet Archive. The original production date was likely March 3, 1987. But as previously noted, the recording from the Archive is a rerun dated January 27, 1989.
- Eddie Dombrower appears in another *Chronicles* episode to discuss a program he referenced in this appearance, *Earl Weaver Baseball*, so I'll defer delving into his background until later.
- Harold Cohen, the artist whose work Stewart Cheifet referenced in the studio introduction, was best known for creating AARON, one of the first artificial intelligence programs designed to produce art. Cohen was a professor at the University of California, San Diego, for three decades and served as the school's Center for Research and Computing until his retirement in 1998. Cohen died in 2016 at the age of 87. The Computer History Museum published an article by Chris Garcia memorializing Cohen and his work with AARON following his death.
- Dr. Margo Apostolos is still affiliated with the University of Southern California as a professor of dance. Since 2007, she's concurrently served as the co-director of the Cedars-Sinai/USC Glorya Kaufman Dance Medical Center in Los Angeles, which she co-founded with orthopedic surgeon Dr. Glenn Pfeiffer. Apostolos also authored *Dance for Sports: A Practical Guide*, which was published in 2018.
- Sharon McCormack graduated from Humboldt State University–now Cal Poly Humboldt–with an art degree focused on photography. She transitioned to holography after taking a class at the San Francisco-based School of Holography in 1970, which she later took over as owner and director from 1975 to 1989. Two of her most commercially famous works were published in 1991: a *Sports Illustrated* cover featuring an image of Chicago Bulls star Michael Jordan, and the cover art for Prince's album *Diamonds and Pearls*. McCormack later relocated to

Washington State and continued to work in holography well into the 2000s. She reportedly passed away in 2016.

- John Burke retired in 2015 from his role as chief conservator at the Oakland Museum of California. Following his retirement he taught at the now-closed John F. Kennedy University and the Tainan National University of the Arts in Taiwan.
- Stacy Mitchell and her husband founded Great Wave Software in 1984. Based in Scotts Valley, California, Great Wave largely became known for developing educational software, including *Reading Mansion* and *NumberMaze Challenge*. In January 1999, the Mitchells sold Great Wave to the Ideal/Instructional Fair Publishing Group, a division of the Chicago-based Tribune Company.
- *Invisible Cities* debuted in December 1985 at Stanford University's Memorial Auditorium. Brenda Way was the choreographer and Michael McNabb composed the music for the ballet, which was developed in conjunction with Stanford's Robotic Aid Project. Margo Apostolos helped program Way's choreography into "Howard," a 120-pound seven-jointed robotic arm that cost $50,000. (I believe this is the same Stanford robotics project featured in a February 1985 Wendy Woods report that I covered in a previous blog post.)
- The news item about Ernő Rubik refusing to license his "Rubik's Cube" for computers puzzled me at first because I remembered hearing about a version of the famous game for the Atari 2600. Indeed, Atari, Inc., published *Video Game Cube* for the 2600 in 1982, which was an unlicensed knockoff. Atari did briefly acquire a license to use the "Rubik's Cube" name around 1984 but that only lasted a short time. There have apparently been a number of computer games since then using the "Rubik's" name, so it looks like Rubik later reconsidered his position.

Chapter 7: The Language Experience Program and PALS

Dr. Edward Fry, then a professor at Rutgers University in New Jersey, said in a 1987 report that young school children should be taught keyboard typing as opposed to cursive writing. This was a fairly radical notion for 1987 as computers were not yet commonplace in the home. And there was a feeling among many educators at the time that learning to write cursive was an essential step in promoting literacy itself.

This next *Computer Chronicles* episode, also from 1987, dealt with the subject of adult illiteracy and how computers were being used to address it. Stewart Cheifet opened the episode by showing this week's co-host, Jan Lewis, a pair of job application forms, for a waiter and a gas station service attendant respectively. Cheifet noted that he and Lewis were both "fairly well educated people," yet they were having trouble figuring out how to fill out all of the blanks on these forms. So imagine what it must be like if you were functionally illiterate.

Cheifet said computers seemed to be doing well in teaching adults to read even though traditional computer-aided instruction in schools was not working too well. Lewis said the difference was in the implementation at the adult level versus at the elementary school level. The theory–that somebody could learn better if they could learn at their own pace and with immediate feedback–still held at both levels.

California Libraries Used Apple II Software to Teach Adults Reading

Wendy Woods presented her first remote segment, which focused on an adult literacy program used by the Richmond Public

Library in Richmond, California. Woods said that California was at the forefront of the literacy movement, with $4 million given to libraries annually to teach adults how to read. And of all the participating libraries, Richmond was considered a leader in the use of computers to teach literacy.

Woods said computers were, in fact, a key element of the Richmond program, known as L.E.A.P. Sharon Pastori, the director of the program, told Woods the computer was non-judgmental and private. It didn't tell a user it was tired of working on a problem. Repetition was often important in learning how to read, and even with an understanding tutor, the student can feel embarrassed about having to constantly go over the same thing. But that wasn't an issue with the computer.

Students in the L.E.A.P. program ranged from those who couldn't read at all to those who simply needed to expand their spelling skills or reading comprehension, Woods explained. That wide range of needs initially prompted months of research. Richmond staffers looked at 20 different software programs that they used regularly. But deciding which programs to use was no easy task, since most literacy software was designed for children learning how to read and write. And the Richmond staff needed to find software that wouldn't "talk down" to adults.

Susan McAllister, a L.E.A.P. staff member, said that at first it was very hard. They picked a lot of different things and figured they would experiment and find out what worked. There was a lot of software now available that targeted remedial reading at the high school and young adult level, which worked okay. McAllister added there was a growing market for adult schools and community colleges to use computers in adult literacy programs, especially with the speech capabilities of many computers, which could help people learn to read at a basic level. But she said the market was still wide open and there was room for other products to enter this area.

Still, Woods said, most students said they were pleased with the software, and the computers had helped them. One student, Mona Lisa Bean, told Woods that the computer made things easier because there were games to make it a more interesting challenge as opposed to just pure memorization.

Woods said the next addition to the L.E.A.P. program, which currently used Apple II computers, would be a Macintosh. Staffers said they wanted to see how using the Macintosh's mouse-based interfaced could aid in the teaching of reading.

Literacy for the People

John Fleischman and Jane Nissen Laidley joined Cheifet and Lewis in the San Mateo studio for the next segment. Fleischman was the administrator of media services with the Los Angeles County jail's correctional education program. Laidley was the executive director of the non-profit People's Computer Company (PCC).

Lewis opened by asking Fleischman to define "functional illiteracy." Fleciscman said it was basically a person's inability to read and write to function effectively in everyday life. There were very few true "illiterates" anymore. Most people could read and write their name. So the new tag that was used was "functional illiteracy."

Lewis asked how the computer helped with functional illiteracy. Fleischman said the computer was an infinitely patient tool. Many adults do not like to admit to a person that they can't read. The computer doesn't know.

Cheifet turned to Laidley and asked what PCC did in the area of illiteracy. Laidley said PCC was a consultant for the Richmond Public Library's program that Wendy Woods featured in the prior segment. She said the goal was to use the computer to teach reading and writing skills. The computer worked in tandem with both the student and a tutor.

Following up, Cheifet asked if there had been any resistance to using computers. Laidley said there was more resistance from the tutor than from the students based on the feedback from Richmond. But she felt that was primarily because the tutor had lived and taught for 50 to 60 years without a computer. They didn't expect learning how to use a computer when volunteering to teach adults how to read.

Lewis asked about the balance between the use of the computer and the human tutor to meet a particular student's needs. Laidley said PCC recommended to Richmond that the tutor and the student stay together for a number of hours in the beginning. What surprised Laidley, however, was that the students moved towards using the computer faster than what had been anticipated by PCC's course materials. So they had to go back and re-write those materials.

Cheifet said this surprised him given that the stereotype was that an adult was less likely to feel comfortable in front of a computer keyboard than a child. Laidley said the "learner" was more comfortable. The student was generally more eager than the instructor. Many adults who dealt with illiteracy were especially excited as they believed they would never have access to technology like a computer.

Cheifet turned back to Fleischman, who dealt with adult jail inmates. How did computers work in that environment. Fleischman said they were "lined up two-deep to use the computers." The "time on task" was incredible as his students were completely focused when using the machines.

Pushing back a bit, Cheifet asked if there was any hard evidence to suggest computers actually worked in teaching adult literacy. Laidley said PCC did a year-long study with the Richmond program, which she believed was the first in California and one of only a few done in the United States. Obviously, she would like more studies done. But people don't fund the research. She hoped that people would look at PCC's study and use that as a jumping off point for their own research.

Penn State Program Used Speech Synthesis to Help Teach Reading

Stewart Cheifet presented the next remote segment, which focused on a "talking computer" program developed at Penn

State University. Cheifet narrated some B-roll footage taken at Northwest Elementary School in Lebanon, Pennsylvania. While most of the students here were kids, lately adults had been taking instruction in how to read, Cheifet said.

For example, Deborah Swoyer was a mother of two school-age children. She was a high school graduate but could not read as well as her daughter, who was in the fourth grade. Swoyer said that made it difficult to help her child with her homework. Cheifet said Swoyer was now working with an Apple IIe-based literacy training course that used an ECHO GP voice synthesizer so that the computer could speak to the student. The software was written in SuperPILOT, an extended version of Apple PILOT.

One problem with computer-based literacy courses, Cheifet noted, was that they required expensive computers like the Apple II. But Dr. Eunice Askov of Penn State, who was in charge of the program used at the Lebanon school, said she hoped that more businesses and industries would open up the use of their computer facilities after-hours to adult literacy programs.

Cheifet said the Penn State software was unique in teaching reading by showing the students word configurations based on research that showed adults recognized the “shape” of words more than their phonetic sounds. But the computer did more than teach reading. Dr. Elizabeth Wile, who worked with the adult literacy program at the Lebanon school, told Cheifet it also helped restore an adult’s sense of self-esteem.

Cheifet added that when Deborah Swoyer and her tutor, Dolores Meck, first started using the computer courseware, both were scared and afraid they couldn’t do it. Now, they both loved the computer. Meck told Cheifet she was a “computer convert.”

Taking a LEAP Into Adult Literacy

Back in the studio with John Fleischman and Jane Nissen Laidley, Lewis asked Fleischman to demonstrate the software he used to teach literacy to adult inmates at the Los Angeles County jail. Fleischman said the software was called the *Language*

Experience Program I (LEAP I), which was recently published by Educational Activities, Inc. (It's not clear to me if this was the same L.E.A.P. discussed in the earlier Richmond library segment.) *LEAP I* used a person's existing skills, such as the knowledge of their own family and friends, and channeled that into a reading lesson. It was like a next-generation word processor used as a reading instruction program.

Fleischman ran a demonstration of *LEAP I* on an Apple IIe. The main screen asked the user to select from a list of topics they could write about. Fleischman asked Lewis to select one. She selected "JOB." The software then prompted her with questions about her job. Fleischman said that in an actual classroom setting, he would sit down with the student to explain the process. Cheifet noted that there was a level of sophistication necessary to read the on-screen instructions. Was that a problem? Fleischman said it was a big problem for someone reading on a 1.5-grade level. So those students would need to do more work initially, or work with another student who was reading at a higher level.

Continuing the demo, *LEAP I* prompted Lewis to write three sentences about her job. Lewis entered some text. The software returned a message explaining that she did not write three sentences as instructed. The software took her back to the prior screen to add additional sentences. Fleischman said when a student completed this assignment, they would take their printed output up to the teacher or tutor and review the materials together. Fleischman noted in Lewis' sample text she misspelled a word. In a classroom setting, she would sit down and re-type that word and correct any grammatical errors. All of the student's work was then recorded on a personal diskette. There was about 25 hours of total instruction in the program.

Cheifet asked Laidley how using something like *LEAP I* was any different than just having a student write three sentences on a piece of paper and hand it to the instructor. Laidley said the difference was that for an adult who has difficulty reading, they also had difficulty writing. Those were different skills. Handwriting required a specific set of motor skills. Using a computer meant the student only needed to know how to push a button. More to the point, the computer produced a printout that could be easily read by the instructor when giving feedback. The student's handwriting would not get in the way.

Ever the consultant, Lewis asked about the cost-benefit trade-off of using computers in this context. Laidley said PCC's study didn't focus on that issue. She suspected that in a volunteer program like the one at the Richmond library, computers were likely extremely cost effective because of the amount of use by the students on their own.

Would PALS Revolutionize the School System?

Since most of the focus to this point had been on Apple II-based software, it was only fair to give IBM some time as well. In this final segment, Wendy Woods reported on an adult literacy program in Flint, Michigan, being used to retrain workers in the automobile industry. Woods noted that Flint reflected many of the difficulties faced by auto manufacturers. And many laid-off workers needed help learning how to read.

Dr. David Spathelf, the superintendent of the Genesee School District, which included Flint, noted the city was in the midst of a transition from an industry that required heavy manual labor with less academic skills to a high-tech industrial community. And when you looked back at the history of people graduating from public schools, they could obtain good high-paying jobs with minimal skills. But that was no longer the case.

Woods said Flint was the test center for a revolutionary approach to teaching literacy with computers, both for beginning readers and those who never learned. The program was called PALS, or *Principle of the Alphabet Literacy System*. PALS grew out of a program aimed at teaching reading and writing skills to kindergarten-age children. It was developed by Dr. John Henry Martin and licensed by IBM. Martin told Woods that learning to read was the single most difficult thing to learn in the English-speaking world, noting the United States had the highest rate of failure in that level of learning than anything else that occurred between the ages of 5 and 25.

Woods explained that the PALS adult classroom had laserdisc players, touch-sensitive computer screens, typewriters, and PCs. From the moments students arrived, they were immersed in computer technology. The textbook was on a laserdisc in the form of a story related in comic-book style. Students learned touch typing simultaneously and could proceed at their own pace. Martin said that coming to the computer without the intervention of an adult meant that they were in effect teaching themselves. The seeming "dehumaization" that some people decried as a technological intrusion proved to be quite therapeutic, he noted, adding that the real damage of illiteracy had already been done to these students by other people.

After about 20 weeks in the PALS program, Woods said, about 80 percent of students had improved their reading skills by an average of 2.5 years of schooling. The self-paced rate of instruction seemed to be an important part of that success. One student, Genetha Campbell, told Woods the software helped by breaking the words down into individual sounds. During the time Campbell was in school, she said a teacher would just "flop" a word on you, and either you learned it or you didn't. In the PALS program, however, she could work at her own pace. Another student, Chris Sewell, said the PALS course taught him to read things that he had never read before. And as of today, he could now fill out a job application.

From the teacher's point of view, Woods said, the central role of the PC might appear to be a threat. But the instructor still played a pivotal role. One PALS instructor, William Deacon, said that the use of computers gave him more time to circulate and talk to individual students about individual problems. The computer essentially did a lot of the "tutorial" work, freeing him up to concentrate on special cases and individualized problems.

Woods reiterated that PALS was adopted from Martin's reading program for children called *Writing to Read*, which shared the same underlying concepts. Martin said that students were invited to learn in "abysmally poor" ways. But with *Writing to Read* and PALS he brought to the forefront the intellectual structure of what a word was and made it apparent to a student that a physical representation of the word was a simple system called the alphabet.

Martin told Woods that it was still too early to tell if computer instruction indicated the need for a radical restructuring of teaching methods. But he did anticipate some major changes. Having lived his life in the world of the schools, the concept that a school consisted of a series of boxes that you put 25 to 30 children with one teacher all day–or shuffling them between specialized teachers–was primed for radical change. Ultimately, he believed that technology would "blow those walls apart."

Atari Filed Antitrust Lawsuit Against Nintendo Over "Lockout" Chip

Although this episode was originally broadcast in March 1987, the episode available from the Internet Archive was a rerun from December 1988. Cynthia Steele presented the "Random Access" segment for the rerun.

- Cambridge North America announced the MacLite package, which included a two-pound Cambridge Z88 portable computer and a special EEPROM that enabled the Z-88 to read Apple Macintosh files. Steele said the package would be formally unveiled during the upcoming Macworld Expo in San Francisco.
- Matsushita announced it would sell Tandy PCs under the Panasonic brand name in the United States and Europe.
- The U.S. Department of Commerce said the U.S. software industry was booming in Japan, with 1988 sales expected to top $10 billion, an annual growth rate of nearly 30 percent–or roughly twice the rate of the domestic market.
- Sanyo announced plans to move its computer-research facility from Japan to the United States. The company was also looking for a new U.S.-based manufacturing facility.
- Atari Corporation filed an antitrust lawsuit against

Nintendo over the use of a "lockout" chip in the Nintendo Entertainment System to prevent unlicensed game cartridges from working with the console.

- Paul Schindler reviewed *In-Synch* (American Video Teleconferencing Corp., $500), a memory-resident program that allowed two people to work on the same file at the same time using separate computers over a modem connection. (An earlier version of *In-Sync* was featured in a November 1986 *Chronicles* episode.)
- The Good Byte, a $200 pocket-sized computer with the entire text of the Bible in a searchable form, would be introduced at the upcoming Consumer Electronics Show in Las Vegas.

John Henry Martin (1916 - 1994)

Dr. John Henry Martin died in July 1994 at the age of 78. Born and raised in Paterson, New Jersey, Martin spent the early part of his career working in public school administration. In the 1950s he served as principal of a junior high school on Long Island and as superintendent of the Wayne, New Jersey, school district. He returned to Long Island in 1961, taking over as the superintendent of the Freeport schools.

In May 1964, Martin left Freeport for the Mount Vernon school district in New York's Westchester County. His tenure there proved to be brief due to the ongoing fight against the racial desegregation of the Mount Vernon schools. The white, Roman Catholic-controlled school board opposed allowing Black children to attend schools with white children. Martin attempted to broker a "compromise" with the racists, which proved futile and led to death threats against him and his family. On September 13, 1966, Martin announced his resignation four days into the new school year. (The racists continued to fight desegregation in Mount Vernon for another 30 years.)

In 1973, Martin suffered a severe heart attack at his Long Island home due to complications from a viral infection. According to a 1988 *Los Angeles Times* profile, Martin was considered "dead on arrival" at the hospital, and even after doctors revived him, he was later “sent home to die.” But two years after this supposed death sentence, Martin recovered and decided to reenter the education field as a literacy consultant.

Martin officially teamed up with IBM in 1982 to distribute his *Writing to Read* program. A two-year test study of 10,000 children found that pupils following Martin’s program “outperformed comparison groups in many measures used, and equaled performance in other measures,” according to the *Times*. This led IBM to start marketing *Writing to Read* not just in the United States, but also in Canada, Bermuda, South Africa, and several Asian countries. IBM and Martin’s consulting firm, JHM, Inc., later marketed PALS as a follow-up adult version of *Writing to Read* in 1986. As of 1988, there were 350 PALS laboratories throughout the country, including one at the *Los Angeles Times* itself.

Martin, who moved to Florida after his 1973 heart attack, continued working up until his death in 1994. He passed away at his summer home in New Hampshire.

Jane Nissen Laidley (1942 - 2003)

Jane Nissen Laidley died in December 2003 at the age of 61. Born and raised in the area that later became known as California’s Silicon Valley, Laidley took over the People’s Computer Company (PCC) as its executive director in 1982. PCC grew out of an earlier project called the Portola Institute, which was started by Bob Albrecht, a former computer engineer with Honeywell and Control Data Corporation; and Dick Raymond, a former consultant with the Stanford Research Institute (an early *Computer Chronicles* sponsor).

Among the non-profit Portola Institute’s early projects was publishing Stewart Brand’s *Whole Earth Catalog*. (Brand later co-founded The WELL, an online service that was profiled in an earlier *Computer Chronicles* episode.) While at Portola, Albrecht met a high school teacher, LeRoy Finkel, with whom he co-founded a for-profit computer book publishing arm called Dymax. Dymax later moved to Menlo Park, California, where it established the People's Computer Center, a publicly available time-share service that allowed anyone to access a DEC minicomputer.

In October 1972, Albrecht launched the *People's Computer Company* as a newsletter that primarily featured listings of BASIC programs that anyone could use. PCC then became its own standalone nonprofit corporation. It launched other publications, notably *Dr. Dobb's Journal* in 1976, whose first editor was original *Chronicles* host Jim Warren. By 1979, PCC employed 30 people–most of them part-timers–and had started working with local libraries in California to offer computer services.

When Laidley took over PCC in 1982, the organization began receiving substantial funding from the National Science Foundation to expand its offerings. In addition to the projects discussed in this episode, PCC created a number of model computer-literacy and training projects. PCC also designed Apple's community affairs program and published a newsletter focused on adult literacy and technology.

While still working at PCC, Laidley earned a doctorate from the University of California, Berkley, and founded a second educational nonprofit, JN4D, which focused on developing technology curricula for schools. (The name JN4D referred to the model of a 1918 plane that Laidley's family owned and restored.) Unfortunately, it appears that both PCC and JN4D ceased active operations after Laidley unexpectedly died at her Berkeley home in 2003.

About That Atari Lawsuit Against Nintendo…

I normally would not go in-depth on a "Random Access" item in the main post, but the way that Cynthia Steele reported the Atari-Nintendo antitrust lawsuit merits some attention. Here is the exact copy that Steele read:

> The bad news is that the Japanese company Nintendo has taken over the U.S. video game

> market. And to make the situation even worse, Nintendo game consoles ‘lock out’ game cartridges made by other manufacturers. So Atari is suing Nintendo, charging them with monopoly and restraint of competition.

This is a surprising degree of editorializing from *Chronicles*, especially in what was ostensibly a news segment. It basically reads like Atari propaganda, accepting at face value the implication that Nintendo must be doing something wrong. Which is ironic given how this litigation ultimately turned out.

First, it’s important to note that when Nintendo “took over” the U.S. home video game market, it was following a total collapse of that market. And the primary cause of that collapse was supply-chain mismanagement by the original Atari, Inc., which had been the market leader prior to the crash. As I discussed in prior posts, the crash led Warner Communications, which owned Atari as a subsidiary, to split the company up. The home video game console and home computer assets were sold to Jack Tramiel, who reorganized those businesses as Atari Corporation.

Now, this was not the Atari that filed the lawsuit that Steele referenced. Rather, the plaintiff in this case was Atari Games, Inc. This was the part of the original Atari, Inc., initially retained by Warner and included the coin-operated arcade games portion of the business. In 1985, Warner formed a joint venture with the Japanese video game company Namco to run Atari Games. The president of Namco’s U.S. subsidiary, Hideyuki Nakajima, took over Atari Games and later led an employee buyout of part of Namco’s share. This effectively left Atari Games as an independent company with Warner and Namco each owning 40 percent and the remaining 20 percent controlled by Nakajima.

So just to be clear, when Steele said Atari sued a Japanese company that “took over” the U.S. video game market, Atari Games itself was a company controlled by a Japanese executive and co-owned by a Japanese company. And since Steele never clarified this was Atari Games, I suspect many *Chronicles* viewers thought she was referencing the Tramiel-owned Atari Corporation, which was more commonly discussed on the program.

Moving on, as Steele said there was a “lockout” chip in the Nintendo Entertainment System (NES). Basically, when a player inserted a Nintendo-licensed game cartridge, it contained a chip that matched a corresponding chip in the base system. If both chips were not present, the game would not load. Nintendo developed–and patented–this lockout system in part to prevent the proliferation of unlicensed third-party games, which not coincidentally had contributed to the downfall of the original Atari.

Atari Games formed a subsidiary called Tengen to develop games for the NES. (The different name was necessary to avoid a conflict with Tramiel’s company, who retained the “Atari” brand for use in home video games.) Initially, Tengen tried to reverse engineer the lockout chip, similar to what was done with the BIOS on the original IBM PC by clone makers. But when those efforts failed, Tengen paid Nintendo for a license.

Atari Games/Tengen–and Nakajima in particular–chaffed at Nintendo’s licensing terms, such as releasing no more than five games per year. Hence the antitrust lawsuit. But several months before Atari Games actually filed its complaint, its attorneys engaged in what can only be described as a an egregious bit of fraud. I’ll let former U.S. Circuit Judge Randall Ray Rader explain what happened:

> In early 1988, Atari’s attorney applied to the Copyright Office for a reproduction of the 10NES program [the lockout chip]. The application stated that Atari was a defendant in an infringement action and needed a copy of the program for that litigation. Atari falsely alleged that it was a present defendant in a case in the Northern District of California. Atari assured the “Library of Congress that the requested copy [would] be used only in connection with the specified litigation.” In fact, no suit existed between the parties until December 1988, when Atari sued Nintendo for antitrust violations and

> unfair competition. Nintendo filed no infringement action against Atari until November 1989.
>
> After obtaining the 10NES source code from the Copyright Office, Atari again tried to read the object code from peeled chips. Through microscopic examination, Atari's analysts transcribed the 10NES object code into a handwritten representation of zeros and ones. Atari used the information from the Copyright Office to correct errors in this transcription. The Copyright Office copy facilitated Atari's replication of the 10NES object code.
>
> After deciphering the 10NES program, Atari developed its own program — the Rabbit program — to unlock the NES.

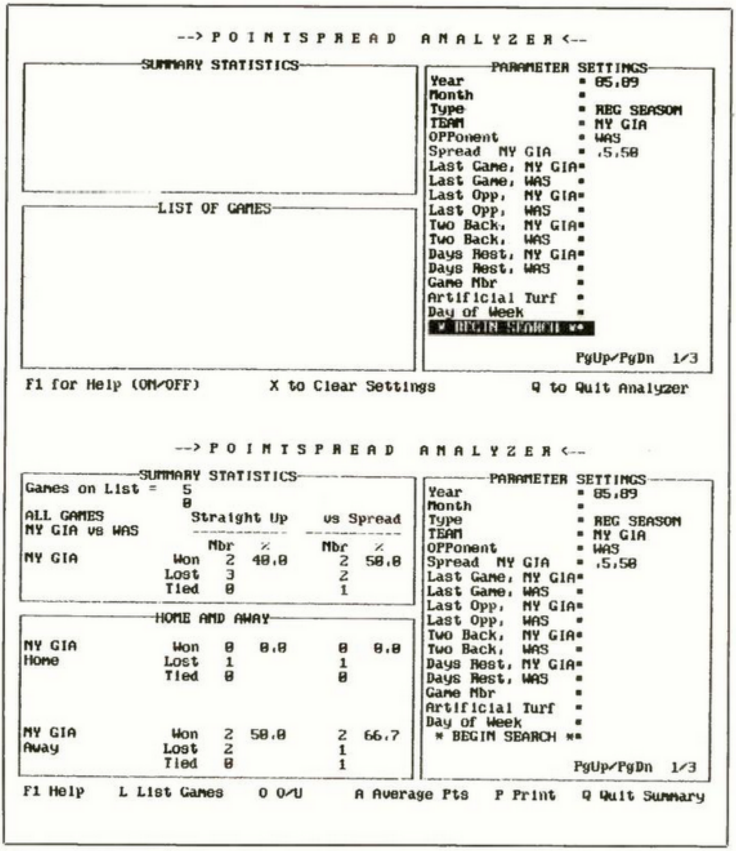
So because Atari/Tengen failed to reverse engineer the lockout chip legally, it resorted to an illegal tactic, which in turn prompted Nintendo to counter-sue Atari Games for copyright infringement. A federal judge subsequently ruled in Nintendo's favor, dismissing Atari Games' antitrust lawsuit and issuing an injunction to prevent Atari from continuing to use its Rabbit program to circumvent the NES lockout chip. Judge Rader subsequently affirmed that decision on behalf of a three-judge panel of the U.S. Court of Appeals for the Federal Circuit.

To be fair, neither Steele nor the *Chronicles* producers knew about Atari/Tengen's Copyright Office shenanigans when they reported on the initial filing of the lawsuit. But it goes to show how in the 1980s, anti-Japenese animus colored a lot of reporting about the tech industry.

Incidentally, Jack Tramiel's Atari Corporation would end up filing its own separate antitrust lawsuit against Nintendo over the latter's dominance of the U.S. video game market. That case ended in a 1992 jury verdict for Nintendo.

Notes from the Random Access File

- This episode is available from the Internet Archive and has an original date of March 10, 1987. As previously noted, the Archive's recording is actually a rerun dated December 29, 1988.
- Dr. Eunice N. Askov received her doctorate from the University of Wisconsin-Madison in 1968. She served as co-director of the Institute for the Study of Adult Literacy and the Goodling Institute for Research and Literacy, both based out of Penn State. She became a Distinguished Professor at Penn State in 2001.
- Matsushita's decision to distribute Tandy PCs was driven, at least in part, by the 100-percent tariffs imposed by the Reagan administration on imports of personal computers, which I discussed in a recent post on laptops. According to the *Los Angeles Times*, the tariffs forced Matsushita to pull its own Panasonic-branded machines from the U.S. market after just nine months. My guess is that the tariffs also led to Sanyo moving its computer research operations to the United States.
- The Cambridge Z88 was a portable computer similar in form factor to a TRS-80 Model 100. Cambridge Computer was actually a division of Sinclair Research, the company best known for the Sinclair ZX Spectrum computer. The MacLite was nothing more than a Z88 with a ROM that included additional software allowing users to create and read data compatible with Macintosh software, including *Hypercard*. The Z88 retailed for around $850 according to newspaper ads I found. It's not clear how well–or how long–the MacLite-branded units sold. Apple reportedly objected to the use of the "Mac" prefix as a violation of its "Macintosh" trademark.
- Special thanks to Alex Smith, whose 2019 book *They Create Worlds* provided much of the background information on People's Computer Company. Smith's podcast, also called *They Create Worlds*, has a number of episodes discussing the sordid history of Atari as well, and of the Atari Games-Nintendo lawsuit in particular.



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                  --> P O I N T S P R E A D   A N A L Y Z E R <--

  SUMMARY STATISTICS                             PARAMETER SETTINGS
                                            Year                 = 85,89
                                            Month                =
                                            Type                 = REG SEASON
                                            TEAM                 = NY GIA
                                            OPPonent             = WAS
                                            Spread  NY GIA       = .5,50
                                            Last Game, NY GIA=
                                            Last Game, WAS   =
                                            Last Opp,  NY GIA=
  LIST OF GAMES                             Last Opp,  WAS   =
                                            Two Back,  NY GIA=
                                            Two Back,  WAS   =
                                            Days Rest, NY GIA=
                                            Days Rest, WAS   =
                                            Game Nbr         =
                                            Artificial Turf  =
                                            Day of Week      =
                                            * BEGIN SEARCH **

                                                      PgUp/PgDn  1/3
F1 for Help (ON/OFF)      X to Clear Settings       Q to Quit Analyzer
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                  --> P O I N T S P R E A D   A N A L Y Z E R <--

  SUMMARY STATISTICS                             PARAMETER SETTINGS
Games on List =   5                         Year                 = 85,89
                  0                         Month                =
ALL GAMES          Straight Up   vs Spread  Type                 = REG SEASON
NY GIA vs WAS      -----------   ---------  TEAM                 = NY GIA
                    Nbr   %      Nbr   %    OPPonent             = WAS
NY GIA        Won    2  40.0      2  50.0   Spread  NY GIA       = .5,50
              Lost   3            2         Last Game, NY GIA=
              Tied   0            1         Last Game, WAS   =
                                            Last Opp,  NY GIA=
  HOME AND AWAY                             Last Opp,  WAS   =
NY GIA        Won    0   0.0      0   0.0   Two Back,  NY GIA=
Home          Lost   1            1         Two Back,  WAS   =
              Tied   0            0         Days Rest, NY GIA=
                                            Days Rest, WAS   =
                                            Game Nbr         =
                                            Artificial Turf  =
NY GIA        Won    2  50.0      2  66.7   Day of Week      =
Away          Lost   2            1          * BEGIN SEARCH **
              Tied   0            1
                                                      PgUp/PgDn  1/3
F1 Help    L List Games    O O/U     A Average Pts    P Print    Q Quit Summary
```

Two sample screens from “Pointspread Analyzer.” Each screen is divided into three boxes, two on the left side and one on the right side. The right side box contains “parameter settings” for the user to input data. The left side boxes contain “summary statistics” and a “list of games,” respectively.

Chapter 8: Computer Sports World, Thoroughbred Handicapping System, and Pointspread Analyzer

On April 28, 1988, Mark Herbst of Harrisburg, Pennsylvania, went to the offices of the Pennsylvania Lottery to redeem the winning "Super 7" ticket from a July 1987 drawing. Under lottery rules, the winner had one year to claim their prize. Herbst, a clerk at a video rental store, told the press that he had "found the winning stub in an old cigar box." He said he played the lottery so frequently that he often forgot to actually check his tickets. It was only a news report a few days earlier about unclaimed lottery prizes that prompted him to see if he might have a winning ticket.

Some people at the lottery office thought Herbst's winning ticket was sketchy. But the ticket's computer validation code was accurate, so the lottery cut Herbst a $469,989.55 check for the first installment of his $15.2 million jackpot. But within hours, lottery officials confirmed their initial suspicions were correct: Herbst's "winning" ticket was indeed a forgery.

Herbst immediately came clean to agents from the Pennsylvania Attorney General's office. He said that a friend, Henry Rich, approached him with the fake ticket and asked him to bring it to the lottery office. Rich worked for Control Data Corporation (CDC), the company that provided the Pennsylvania Lottery's computer system. Rich managed to access a file containing a list of unclaimed jackpot and then used CDC's computers to produce a duplicate of the winning ticket.

In a twist that would make Michael Scott proud, lottery officials realized that Rich's ticket was a fraud because he printed it on paper that had been returned to the state from a lottery agent in Scranton. But the paper used in the actual winning ticket–which was claimed by a couple from New Jersey before the one-year deadline expired–came from a different part of the state.

After Herbst cooperated with the Attorney General's office to trap Rich in a sting operation, both men later pleaded guilty to criminal charges. Herbst received a prison sentence of 2 to 4 years. Rich initially received a 5 to 10 year sentence, although an appellate court later ordered a new sentencing hearing after finding the trial judge failed to give reasons for part of his decision.

Was Picking Horses Like Picking Stocks?

The Pennsylvania Lottery scandal took place about a year after this next *Computer Chronicles* episode first aired. The subject of this episode was "computers and gambling," and ironically, Stewart Cheifet mentioned *another* Pennsylvania Lottery scandal that took place several years earlier–and explained how CDC's computer system was designed to help prevent any future attempts at lottery tampering.

But before we get to that, the episode began with Cheifet showing George Morrow, this week's co-host, an early example of a specialized computer targeting gamblers, the Mattel Horse Race Analyzer. Cheifet explained that you could enter data from the *Daily Racing Form*, a newspaper covering the horse race industry, into the Analyzer and it would predict which horses were most likely to win.

Cheifet noted that using a computer to pick a winning horse was not much different than using a computer to figure out which stock was going to "win" on Wall Street. Morrow agreed, noting that people who recommended stocks performed much the same function as handicappers in horse racing. In both cases, computers were an analytical tool that helped you form judgments. Gambling also involved an element of pure chance, and in that respect computers were being used to help entertain people.

Some Casino Operators Remained Skeptical of Video Slots

Speaking of entertainment, Wendy Woods presented her first report from Reno, Nevada, the home of International Game Technology Corporation (IGT), one of the country's biggest slot machine manufacturers. Over B-roll footage of the Harrah's casino in Reno, Woods said that poker chips were increasingly sharing the gaming floor with microchips–especially in the slot machines.

Charles Mathewson, the president and CEO of IGT, told Woods that poker machines were a prime example of how computer chips had transformed the industry. For all intents and purposes, computerized poker machines didn't even exist 10 years ago. But today they represented 34 to 36 percent of the Nevada market.

Woods noted that the machines produced at IGT had little in common with their clanking, mechanical ancestors. IGT's slots were sophisticated personal computers controlled by an Intel microprocessor that featured special graphics and sound chips. The machines were even designed by computer.

Peter Dickinson, IGT's vice president of engineering, explained that when a player put their money in a computerized slot machine and pulled the handle, the microcomputer inside was programmed to compute a random number using a 32-bit random number generator. The computer then took that random number and "divided it down" to a number within the range of the number of symbols on the reel strips in the slot machine. That then determined the outcome of the game.

Woods said that since the outcome of the game was determined electronically, the spinning reels were included merely to preserve the traditional external appearance of the slot machine. This was important to casino operators. Bob Bittman, IGT's director of marketing, said that in some cases the electronics scared the operators away. For example, a slot machine that only used a video display to replicate the look of a traditional slot machine didn't attract a traditional slots player. It was "too much" of a computer screen, Bittman said. But when the same electronic technology was used with poker machines, customers seemed to love it.

Concealed within the friendly interface of the electronic machines, Woods noted, was a high level of electronic security. This included an optical reader that could tell if a coin was being dropped in or being pulled out of the slot. There were also sensors that could detect if a door was open or someone had tampered with the reels. The electronic slot machines were also tied into a local area network that transmitted any discrepancies to a central computer room.

Woods said that at Harrah's, a fully electronic slots game called "Megabucks" used the latest in fiber optics–and even satellite transmission–to tie hundreds of machines together to a central jackpot computer. As each coin dropped, the amount of the bet was transferred by fiber optic cable to the casino's computer center. The mainframe then recalculated and sent the new jackpot information to an LED display on the casino floor. The same system operated between casinos around the state over a satellite link.

Keno was another game that had been radically changed by computer processing, Woods said. While paper tickets were still written out by the player, all data entry, number reading, and bet tabulation were done by computer, which could process the results of a game in about 22 seconds.

Woods added that Harrah's machines were equipped with more than coin slots. The new generation of "one-armed bandits" was more like an automatic teller machine at a bank–with some important differences. You can't make withdrawals or deposits, but the casino would issue personal identification cards to any interested customer.

Computers Offered Handicappers a Statistical Advantage

Robin Cobbey and Michael "Roxy" Roxborough joined Cheifet and Morrow for the first studio segment. Cobbey was president of Computer Sports World. Roxborough was the founder and president of Las Vegas Sports Consultants.

Morrow opened by explaining that Computer Sports World (CSW) was a database of sports statistics owned by Chronicle Publishing Company, the parent company of the *San Francisco Chronicle*. How did those two entities work together? Cobbey said that in the last several years, many newspapers had wanted to get involved in new forms of communication and database services. CSW was one of those companies that were out there in a good market and it was something the Chronicle wanted to pursue.

Morrow asked if CSW was a unique database. Cobbey said there were no other products exactly like CSW, which was an online database. Anyone with a computer and a modem or communicating terminal could connect via a local telephone call 24 hours a day.

Morrow turned to Roxborough, a professional oddsmaker, and asked if he used CSW. Roxborough said yes, it was an instrumental part of making the odds. He thought CSW was fantastic because it saved a lot of time that he previously spent making handwritten notes. The online database also helped with filing and organizing information.

Cheifet asked Roxborough how he kept track of sports statistics and numbers before there were online databases. Roxborough said that he “made do,” but he could do a much better job now with computers. Morrow asked if the database made Roxborough’s work more accurate. Roxborough said it did. He added that gamblers could also access CSW, so that was another reason he needed to keep on top of the technology. Morrow asked if there were others in the gambling business who used CSW as extensively as Roxborough. Roxborough reiterated that there were gamblers who used it.

Cheifet asked Cobbey for a demonstration of CSW, which she pulled up on a terminal connected by modem. The main menu consisted of a live listing of upcoming men’s college basketball games. By typing a three-digit code you could pull up information and statistics about a specific game. Cobbey selected a game scheduled for Sunday, February 22, 1987, between Georgia Tech and DePaul. Roxborough said the data showed DePaul was 13-0 at home this season. That would make DePaul, the home team, a pretty good favorite over Georgia Tech, even though the latter was considered a strong team in its conference. Conversely, Georgia Tech was only 6-6 in road games. Roxborough added that CSW showed each team’s record against the spread during the season and statistics from the last five games played.

Cheifet asked about using CSW to look at National Basketball Association games. Roxborough pulled up a box score from the previous evening's (February 20, 1987) game between the San Antonio Spurs and the Dallas Mavericks. Roxborough said that when he studied a box score he wanted to know if all of the team's starters played. In this particular box score, for example, all of San Antonio's starters played but Dallas starting point guard Derek Harper didn't appear in the game at all. That meant Roxborough would have to find out why. Cobbey said CSW also contained injury reports, which showed Harper had an infected toe and was expected to miss tonight's game against the Golden State Warriors. Roxborough said he would have to make a slight adjustment in his line for that game.

Next, Cheifet asked about baseball. Cobbey pulled up CSW's index of baseball statistics, which went back several years. Roxborough said the key stats he looked for with respect to baseball was how teams did against right-handed and left-handed pitchers respectively, and their performances in day games versus night games. Cobbey added that CSW worked with Roxborough's company to provide odds on teams winning the pennant. Roxoborough said that for the upcoming 1987 season, the odds favored the two New York teams, the Yankees (7-2) and the Mets (7-5). (Roxborough was a bit off. Neither New York team won their respective division and the Minnesota Twins defeated the St. Louis Cardinals in the 1987 World Series. And the Twins were 30-1 underdogs in March according to CSW.)

Cheifet asked Roxoborough if there was any particular sport where the computer was a really big advantage. Roxoborough said college basketball because they had to chart and track 162 teams. There were thousands of variables and injuries to chart for every team.

An Electronic Brain for the Modern Racetrack

Wendy Woods returned with her final report, this time from the Golden Gate Fields horse racing track in Albany, California. Over

B-roll of a traditional bugle “call to the post,” she said that while certain traditions at the track would never fall under the spell of technology, the business of race track betting had in many fields been automated to a level as sophisticated as the nation’s election system. Unlike the old days of just a few years ago, relay systems and tallying by individual clerks had been replaced by massive computerized betting systems.

At Golden Gate Fields, Woods said, the odds, race results, and up to $3 million in bets placed daily passed through seven continuously operating phone lines to the “brains” of the operation–a mainframe at the nearby Bay Meadows racetrack. Betters could still go face-to-face with humans for their wagers, but the clerks all used terminals linked up to the system. The more adventurous better could use a self-serve betting machine or the newest touch screen terminals. Players bet and collected with vouchers that could be used for an entire day of winning or losing.

Woods noted that even the tote board on the track was controlled and automatically updated by this one computer system. Marty Miller, a systems manager with AmTote, the company that ran the system, told Woods that computerized betting was not only efficient but honest as well. But Woods said things didn’t always go smoothly. She said that on the day that new cards were issued the system crashed. Golden Gate Fields officials had to soothe irate customers by issuing “rain checks.” But overall, AmTote’s computerized systems were installed in thousands of racetracks worldwide, indicating it had a pretty good track record.

Could Computers Help You Beat the Spread?

For the next segment, Robert Archer and Michael Orkin joined Cheifet and Morrow back in the San Mateo studio. Archer was president of PDS Sports. Orkin was co-founder of Best Bet Software and a professor of statistics at California State University, Hayward (now California State University, East Bay).

Morrow noted that Roxy Roxborough, the guest from the previous segment, was a skilled oddsmaker and seemed to have an edge by looking at the data but not necessarily using computers to do analysis. Did Orkin have any comment? Orkin said that if Roxborough picked the lines and there was a bias in it, the betters would pick up on it and start betting accordingly. This would lock the bookmakers into a system where they would lose.

Following up, Morrow asked if Roxborough could use a computer program to keep track of that. Orkin said Roxborough likely used computers to keep up with data. But if he actually used a program to pick the line he'd have to keep modifying it if there were any biases that occurred. Oddsmaking was a dynamic process. So to get locked into a program would not be helpful.

Turning to Archer, Cheifet asked if oddsmaking could actually be reduced to statistics. Archer said no, it would always be subjective. The computer was an instrument where the user could manipulate all the data to where they wanted it and help them make a decision. Cheifet asked for a demonstration of this using Archer's product, *Thoroughbred Handicapping System* (THS). Archer said the program required the user to enter data from the *Daily Racing Form* for a particular race. There were 3 variables for the race itself and 11 variables for the horse. Some of the variables included the horse's number of races started, number of wins, total earnings, and days away from the racetrack.

For the demonstration, Cheifet said they'd entered data for three different horses. THS then produced a "power rating" for each horse. The horse with the highest power rating was considered the "favorite" to win the race. Archer said you were looking for a 3.5-point spread between the first and second horses in order to have a "playable race," subject to the handicapper's personal bias. Cheifet asked how THS actually calculated the power ratings. Archer said the program compared the inputted data to a predetermined set of standards.

Cheifet then asked Orkin about his program, *Pointspread Analyzer*, which targeted people betting on American football. Orkin said *Analyzer* contained data about every National Football

League game played since 1979. It was a self-contained database on a single floppy disk. The user could query the database to learn about a team's performance in various situations.

Cheifet asked for a demonstration. Orkin pulled up the program's main screen, which included a number of "parameter settings." Orkin said he asked for the New York Giants record against the pointspread between 1983 and 1986 after losing a road game the previous week. According to the search results, the Giants were 10-5 (66.7 percent) against the spread in the subsequent game. You could also retrieve a list of specific games meeting the search criteria.

At Cheifet's request, Orkin then ran a search of all Monday Night Football games played since 1983. According to *Analyzer*, the home team won against the spread 59.4 percent of the time. Morrow asked if this was something that a bettor considered important. Orkin said it was when deciding what team to pick.

Cheifet asked Orkin how much of an advantage a program like *Analyzer* actually provided. Orkin said the software enabled the bettor to answer a question in a couple of seconds that might take a few hours to do by hand, or that they might not be able to answer at all.

Computers Helped Keep Pennsylvania Lottery Safe

For the final segment, Cheifet presented a remote report on the Pennsylvania Lottery. He noted that each year, Pennsylvania sold more than $1 billion in lottery tickets. And when the jackpot got big enough, that could mean a sales volume of up to one million sales transactions per hour.

None of this would be possible without computers, Cheifet said. And indeed the Pennsylvania Lottery had a massive investment in computers. Retailers sold lottery numbers from online terminals. Computers recreated each day's games on a separate IBM backup system to ensure the integrity of the games. Computers were also used to analyze sales, project jackpots, and to monitor the actual betting.

In fact, Cheifet said, the Pennsylvania Lottery ran one of the most complex computer networks, with nearly 3,000 terminals on a Control Data Corporation system that had 100 percent redundancy and a “hot” backup–so one rarely heard that the computer was down. Michael Keyser, the Pennsylvania Lottery’s online supervisor, told Cheifet that in ten years the system’s uptime was 99.98 percent, as close to perfection as possible with an online system. Keyser said he couldn’t recall any major downtime since the system came online in 1977.

Cheifet noted that one of the primary functions of the computer system was to constantly monitor the lottery’s payoff liability to make sure that no one could “break the bank.” For the lottery’s “Big Four” game, which paid odds of 5000-1, the computer made sure that the state was never exposed to a liability in excess of $5 million per game. If the system detected heavy betting on a particular number, such as “1111,” it sent out a warning and cut off betting on that number.

Heavy betting on a specific number often occurred because lottery players tended to follow certain common patterns. For example, Michael Keyser said that when Pete Rose played for the Philadelphia Phillies and reached a certain number of career hits, many bettors would play that number. Other numbers that might be heavily bet included the Super Bowl score, the Chinese New Year, and the Jewish New Year.

Cheifet said that while the computer system assured a random drawing every time, the law of averages took awhile to work. Keyser said there had been over 3,100 daily number drawings (pick three) in 10 years. But there were two or three dozen numbers out of 1,000 that had still never come up.

The lottery had many safeguards to protect against being broken into, Cheifet said. The computer shut down all games exactly 168 seconds prior to the winning drawing so that all tapes could be removed and nobody could enter a winning number after the drawing. And computer experts actually hired hackers to try and break into the system in order to identify potential weaknesses.

Seven years earlier, Cheifet noted, the Pennsylvania Lottery did fall victim to a scandal, but it had nothing to do with the computers. Rather, most of the balls used in the drawing were weighted so that only 6s would rise to the top. A slow-motion analysis of the drawing–combined with computer analysis–helped identify the culprits. Keyser said offline processing showed exactly where certain bets were coming from and retailers were able to identify the purchasers.

But despite all the computers, Cheifet said, when it came to calculating the payoffs, no one trusted the machines. The numbers were still calculated manually with a calculator, some paper, and a pencil. Keyser added that when you're sitting alone giving away millions of dollars, you had to be absolutely sure you were doing it perfectly.

Even More PC Clones Unveiled at Spring COMDEX

Susan Chase presented this week's "Random Access," which was recorded in March 1987.

- NCR Corporation unveiled two new AT-compatible PCs: a 286 and a 386 machine based on NCR's incremental workstation architecture. Chase said the new workstations would be available later in 1987.
- Hewlett-Packard planned to release three new technical computers and said that its previously announced 930 and 950 business computers would finally ship in fall 1987. Chase noted that all five computers were based on the RISC architecture.
- Digital Equipment Corporation and Cray Research said they would soon introduce a new interface between their computers. Chase said it would be a combination of DEC's hardware and Cray's software and represented an effort to speed up data-transfer rates and step up pressure on IBM in the scientific computing market.
- Paul Schindler reviewed *KidsTime* (Great Wave Software, $50), a collection of five educational software programs for

the Macintosh.
- At the spring COMDEX show in Atlanta, Sharp announced plans to introduce two portables: a PC-AT clone called the PC-7200, and the XT-compatible PC-4500. Chase said that Samsung also planned to show off its new PC clones at COMDEX.
- Japanese companies were working on a new method of software distribution designed to eliminate software piracy. Chase said the proposed “Software Service System” was a box that could be attached to existing computers or built into new machines. Software would not run on the computer until the box authorized it. Users would have to purchase a card to activate the box and give credit for any software purchased.

Keyser’s Computer Played Key Role in Foiling 1980 Lottery Scandal

So let’s start with that earlier Pennsylvania Lottery scandal that Stewart Cheifet alluded to in his closing report. It’s true that unlike the 1988 scandal, the 1980 affair had nothing to do directly with the lottery’s computer systems. But our guest from this episode, Michael Keyser, did unknowingly play a role in the affair.

The mastermind of the scheme turned out to be a well-known local broadcaster, Nick Perry, who was actually the host of the daily lottery drawing on WTAE-TV in Pittsburgh. Sometime around February 1980, Perry started working on a plan to rig the daily number game by replacing the normal balls used in the drawing with weighted balls, as Cheifet described.

According to court records, Perry obtained a set of scales from Jack Maragos, who co-owned a vending machine business with his brother and Perry. Perry then gave the scales and a hypodermic needle to Joseph Bock, a stagehand at WTAE-TV. Bock prepared the doctored balls by injecting them with white latex paint. Another stagehand, Fred Luman, then swapped the weighted balls for the real ones just before the April 24, 1980, drawing.

At the time, the Pennsylvania Lottery had a senior citizen from the community conduct the actual drawing. The senior selected for the April 24 drawing was scheduled to participate in a practice run at 6:30 p.m. that evening. Edward Plevel, a district manager for the Pennsylvania Lottery, was supposed to supervise this process. But Plevel was also in on Perry's scheme. He ended the practice early at 6 a.m. and then left the machines unattended for 45 minutes, giving Luman enough time to pull off the switcheroo.

To clarify, the scheme involved swapping out all of the lottery balls except those with the numbers 4 and 6. On April 24, the Margos brothers drove around Philadelphia and bought up hundreds of lottery tickets featuring various combinations of 4 and 6. As it turned out, the number actually drawn that evening was '666'. After the drawing, Plevel made the official report of the outcome to Michael Keyser, who was in charge of the daily number drawing. (To be clear, Keyser was *not* part of the scheme.)

The lottery ended up paying out $3.5 million in winning '666' tickets. This immediately raised suspicions–at least with the local organized crime syndicate. Tony Grosso, who ran an illegal numbers racket that also took bets on the Pennsylvania lottery, was informed by his subordinates that someone was placing an unusually high number of wagers on 4 and 6 combinations for the April 24. That "someone" was the Maragos brothers, who apparently weren't content to confine their betting to the state-approved lottery dealers.

Grosso immediately tipped off a local reporter that the April 24 drawing had been rigged–and not by him. Initially, Pennsylvania officials dismissed any suggestion the game had been tampered with. But soon other reports came in from Pennsylvania Lottery retailers. One retailer said they saw two men in a white Cadillac come in and purchase hundreds of lottery tickets with 4 and 6 combinations. Another witness, a newsstand operator, said Edward Plevel purchased $80 in lottery tickets that same day, again all in 4 and 6 combinations. Plevel later told the operator to lie and say a "woman bought the tickets and cashed them" if the police started asking questions.

In September 1980, a special grand jury recommended criminal charges against Perry, Plevel, Bock, Luman, and the Maragos brothers. There being little honor among thieves, the Maragos brothers agreed to testify in exchange for immunity. Bock and Luman negotiated plea agreements. Perry and Plevel were the only defendants who went to trial. A jury found both men guilty in May 1981. They each served two years in prison. Perry died in 2003.

Interestingly, the use of a computer played a critical role in Plevel and Perry's unsuccessful appeals of their convictions to the Pennsylvania Supreme Court. Plevel and Perry were both tried in Dauphin County, which is where the state capital of Harrisburg is located. But the rigged lottery drawing took place in Allegheny County (Pittsburgh). Perry and Plevel therefore argued they were deprived of their Sixth Amendment right to a trial in the county where their alleged crime occurred.

The Supreme Court rejected that argument. In an August 1983 opinion, the Court noted that Michael Keyser programmed the final '666' outcome into his computer in Harrisburg. Furthermore, every winning ticket purchased by the Maragos brothers and Plevel had to be validated by the lottery's computers in Harrisburg. Thus, the fraudulent scheme conducted by Plevel and Perry involved numerous "essential" criminal acts that occurred in Dauphin County.

Data Broadcasting Engorged LVSC, Computer Sports World During Dot-com Bubble

Michael "Roxy" Roxborough is originally from Vancouver, British Columbia. While attending American University in Washington, DC, he started dabbling in illegal bookmaking. After graduating, he returned to Vancouver and continued his bookmaking activities in places ranging from pool halls to the Vancouver

Stock Exchange.

In 1975, Roxborough decided to take his talents to Las Vegas, then the only place you could legally place single-game sports bets in North America. He founded Las Vegas Sports Consultants (LVSC) in 1983 after being approached by the Stardust Hotel and Casino to act as its oddsmaker. Roxborough went on to become one of the country's best-known betting line experts.

Roxborough sold LVSC in 1995 to Data Broadcasting Corporation (DBC). I discussed the lengthy history of DBC in an earlier post. To briefly recap, DBC emerged from the bankruptcy of its parent company, Financial News Network, Inc., in 1992. During the 1990s DBC pursued an aggressive expansion strategy, particularly in the burgeoning dot-com economy. LVSC was a key part of a new division called DBC Sports, which later absorbed another company profiled in this episode, Computer Sports World (CSW).

CSW started out as a free online bulletin board back in 1976. Darryl Martin, the service's founder, decided to convert it into an all-sports BBS in 1981. By 1984, he'd sold CSW to the San Francisco Chronicle's parent company and the service expanded into offering full-service sports statistics.

And this was a premium service. According to an October 1987 column by Dan Gutman, the once free BBS now charged $175 for initial signup plus 43 cents per minute for access (63 cents during prime time hours!) Gutman noted that some subscribers were paying upwards of $630 per month to look at CSW's data.

DBC acquired CSW in 1997. That same year, DBC joined with CBS to create MarketWatch.com, a financial news website. CBS was also a minority shareholder in SportsLine.com, a sports news website. After MarketWatch's initial public offering in 1999 quickly went from boom to bust, DBC's own stock collapsed. In 2000, SportsLine.com subsidiary Vegasinsider.com purchased DBC Sports, including Las Vegas Sports Consultants. But this created problems for CBS, which owned 31 percent of VegasInsider.com, as it held the television rights for the NCAA basketball tournament and wanted to create a new NCAAsanctioned website at SportsLine.com. The NCAA objected to CBS owning a stake in a sports oddsmaker. So in 2003, SportsLine.com sold VegasInsider.com to Sports Information Ltd., a United Kingdom-based company.

In 2019, the Denmark-based Better Collective group acquired VegasInsider.com. It seems that the Las Vegas Sports Consultants and Computer Sports World brands were retired sometime before this latest acquisition.

As for Roxy Roxborough, he retired after selling LVSC and moved to Thailand, according to a 2015 ESPN profile by Dave Tuley. Robin Cobbey, the former CSW president who appeared in this episode, has worked as a market research consultant since the late 1980s.

Notes from the Random Access File

- This episode is available at the Internet Archive and was likely first broadcast around March 17, 1987. Based on the discussion of the DePaul-Georgia Tech men's basketball game, the studio segments were probably recorded on February 21, 1987.
- For the record, DePaul won 84-67, which I'm guessing was enough to beat the spread. It was a banner year for the Chicago-based school, which posted a 28-3 record. Led by future NBA player Rod Strickland, DePaul advanced to the regional semifinals of the 1987 NCAA tournament.
- William S. Redd founded International Game Technology (IGT) in 1975. Italy-based GTECH S.p.A acquired IGT in July 2014 for $6.4 billion. GETECH then renamed itself International Game Technology PLC, which remains in business today.
- Charles Mathewson took over as CEO of the original IGT from William Redd in December 1986. He remained with the company until October 2003, when he retired as chairman of the company's board. Matthewson died in November 2021 at the age of 93.
- Peter Dickinson remained with IGT as a senior executive until his sudden death in June 1994 due to a heart attack.

He was 47.

- Bob Bittman retired from IGT in December 2008 after 23 years with the company.
- The Harrah's casino in Reno closed in March 2020 due to the COVID-19 pandemic and never reopened. An investment company subsequently purchased the property and announced plans to redevelop it into an apartment complex.
- I did not find much information about Robert Archer or his company, PDS Sports. PDS Sports was a subsidiary of a Utah-based company, Post Data Services Corporation, which existed from 1971 to 1988 according to state records. Archer registered Post Data Services as a foreign corporation in California in 1987 but there were no further filings after that time. I also found sporadic references to *Thoroughbred Handicapping System* marketed under the "Sports Judge's" name. But I don't know how long the program was on the market for or what ultimately became of Archer and his company.
- Michael Orkin earned his doctorate in statistics from the University of California, Berkeley, in 1971. He joined the faculty at Cal State, Hayward, in 1973 and remained with the school for 31 years, serving as chairman of the statistics department and later as an associate dean. In 2012, Orkin became vice chancellor for educational services for the Peralta Community College District in California. After leaving that position in 2017, he joined Berkeley City College, a part of the Peralta system, as a member of the mathematics faculty.
- It's ironic that Michael Keyser mentioned Pete Rose's hit total as a common source of daily lottery numbers. Rose was famously banned from Major League Baseball for life in August 1989 after a report commissioned by former Commissioner of Baseball Peter Ueberroth found evidence that Rose had bet on baseball games while serving as manager of the Cincinnati Reds. A few weeks before that report came out, Ueberroth backed out of a deal to sell MLB's official statistics to Computer Sports World. Ueberroth was apparently shocked–shocked–to learn that people were using CSW stats as a means of gambling and

not just to play rotisserie baseball.

Chapter 9: WordStar 4.0, WordPerfect 4.2, Microsoft Word for MS-DOS 4.0, and OfficeWriter 5.0

The history of computer word processing applications can be divided into three main periods, each tied to a specific platform transition. In the first period–the late 1970s and early 1980s when CP/M machines dominated the microcomputer market–*WordStar* was the gold standard. After the IBM PC came along and MS-DOS displaced CP/M, *WordPerfect* similarly overtook *WordStar*. Then, as Windows was finally accepted by the masses at the start of the 1990s, Microsoft's *Word* usurped *WordPerfect* as the one word processor to rule them all. (And if we extend things to the present, in the post-PC age there is effectively a commercial word processing duopoly with Microsoft 365 and Google Workspace.)

This next *Computer Chronicles* episode from March 1987 aired during this second period when *WordPerfect* had taken the lead. *WordStar* was struggling to regain its footing after a number of stumbles. And *Word* was still thought of primarily as a Macintosh application. There were also dozens of smaller companies still competing for a dwindling share of the market.

This episode was actually the first in a four-part series on "business applications." The next two programs focused on spreadsheets, while the final delved into database management. To begin this word processing episode, Stewart Cheifet showed co-host Gary Kildall what might be dubbed the original word processor–a pencil. Cheifet quipped that early word processors didn't do much more than the simple pencil. But they were much more sophisticated these days. And some people were saying that word processors were now evolving into desktop publishers.

Kildall agreed that desktop publishing was an evolution from word processors. But it was a lot more. Desktop publishing involved the integration of text and graphics, taking into account the structure of the document and the page layout. So desktop publishing was still far more complicated, and he thought the two applications would continue to remain separate for some time.

Single-Programmer Shareware Competed Against Big Corporate Word Processors

Wendy Woods presented her first remote segment, which focused on a low-cost word processing program called *PC-Write*. Woods said that most software packages came with a stern warning about making more than your fair share of copies. So why did *PC-Write* ask its owners to make as many copies as they liked? Because *PC-Write* belonged to a class of programs called *shareware*, and its success depended on as many people as possible trying it out for themselves.

Paul Berry, a professional writer, told Woods that the nice thing about *PC-Write* was that you could try it out and say, “Yes, this is what I want,” or “No, this isn’t what I want.”

Woods said that if you couldn’t get a copy from a friend, *PC-Write* diskettes were available from the publisher for $16. If you decided you liked the program, you sent in the $89 registration fee in exchange for a manual and updates. Woods added that *PC-Write* was not a “bare-bones” program. It included a spelling checker, mail merge, and laser printer support. The program also allowed for some split-screen editing and custom character sets.

Jay Siegel, a writer and programmer, told Woods that *PC-Write* was written in the Pascal programming language, and he thought it was very fast and efficient because it was done by a single programmer. In his experience, when you found a program that was a pleasure to use, it usually had just one programmer behind it.

Woods said the idea of shareware seemed far removed from the corporate mainstream of commercial software, which could be explained in part by its unusual origins. Siegel said that shareware had its roots in ham radio. The original people who developed the shareware concept came from the amateur radio community, which was based on the idea that the airwaves were free and the goal was an exchange of information.

Keeping Power Users Happy

Walter Feigenson and Dan Lunt joined Cheifet and Kildall for the first studio segment. Feigenson was vice president for product marketing with MicroPro International, the company that developed *WordStar*. Lunt was vice president of marketing with WordPerfect Corporation.

Kildall opened by asking Feigenson what kind of features you needed to have in a word processor these days to keep it on top. Feigenson said the primary method was listening to the users. He noted that users of word processors were especially vocal. They loved to give you suggestions, and all you had to do was listen to them.

Lunt added that as WordPerfect listened to its users, a large number of them were attorneys, accountants, and professional people, and they all wanted features specifically directed at their industry. For example, WordPerfect received a lot of requests for line-numbering and “table of authorities” features from attorneys, so they were added.

Kildall turned back to Feigenson and asked for a demonstration of *WordStar 4.0*. Feigenson opened a document and noted that the new version retained the “classic look” of the traditional *WordStar* interface while adding 125 new features. One of those features was the ability to point to a filename to open it, something that many people had asked for over the years.

Feigenson started editing the sample document. Demonstrating another new feature, he executed a macro to draw a box around the title of the document. (This could also be done manually.) There was also a faster in-context spelling checker. The program flagged a word it didn't understand–the name of a city–and suggested alternative spellings. The user could select an alternative by typing the number next to it. Feigenson said the spell checker could also understand words spelled phonetically. So if you typed "newmonya," the spelling checker would suggest "pneumonia."

WordStar also came with what Feigenson described as a "very elegant" thesaurus. By positioning the cursor over a word and pressing a hotkey, the software displayed a list of suggestions. You could also page through the thesaurus database to look for a specific word.

While Lunt setup his own demonstration, Cheifet asked Feigenson about the biggest complaint people had about the previous versions of *WordStar*. Feigenson said *WordStar* hadn't changed for a long time, but the technology had changed since the last update. And there were hundreds of things that people were asking for. So it wasn't hard to figure out what people wanted, such as an undelete feature and a thesaurus.

Cheifet noted that *WordPerfect* had recently released a new version that had "risen to the top of the pile" in the word processor market. He asked Lunt to demonstrate some of those new features in *WordPerfect 4.2*. Lunt said that one of the goals when designing *WordPerfect* initially was to make the word processor look as much like a typewriter as possible. So when the screen for *WordPerfect* came up, you would see what appeared to be a blank sheet of paper. There was nothing that you needed to go through before that.

Lunt said that *WordPerfect* emphasized a simple interface with a single-keystroke approach for features. So if you were typing text and wanted to make something bold, you simply pressed the "bold" key. If you wanted underlining to appear, you pressed the "underline" key. (In this version of *WordPerfect*, formatting was indicated by color, so bold text appeared in blue, while underlined text appeared in yellow.) He also showed how you could center text and apply automatic text-wrapping to the end of a line.

Cheifet asked about *WordPerfect*'s approach to the thesaurus. Lunt said all the user had to do was point to a word in a document, or type a word, and press the "thesaurus" key. This brought up a list of both suggested synonyms and antonyms.

Cheifet asked about working in columns, which was a feature that *WordPerfect* touted. How easy was it to do columns? Lunt said it was very easy. He pulled up another sample document–the text of the United States Constitution–to demonstrate. The document was set to three "newspaper-style" columns, i.e., where text from column one snaked to column two and then on to column three. *WordPerfect* handled all of this formatting automatically. So if you added text into the document the software would adjust the columns accordingly.

Kildall asked to what extent these word processors could handle graphics. Lunt said *WordPerfect* had "very limited" graphics capability. The program could handle graphs in a character format. It could also block a space within a document for another program to insert a graphic. But in the future, WordPerfect's goal was to make it possible to mix graphics and text together just using its software.

Feigenson said *WordStar* was currently in a similar place. You could insert character-based graphics only. And there were 10 function keys allocated to drawing lines and boxes using characters. You could also use a third-party program to add graphics to a *WordStar* document.

Competitors Emphasized Macro-Based Features

Lewis Levin and Jim Kesler joined Cheifet and Kildall for the next segment. Levin was the product manager for Microsoft Corporation's *Word*. Kesler was the product manager for *OfficeWriter*, a word processor published by Office Solutions, Inc.

Kildall noted that a good word processor today needed to have certain basic features, such as a spelling checker and hyphenation. But what else did you need to have a quality product in the current market? Levin said Microsoft's philosophy was that the word processor should help the user as they wrote. The word processor should help you organize your document and help you figure out what you were trying to say. It was also important for the word processor to show you what the document would look like when you printed it out, especially when using a modern laser printer.

Kesler said that a good word processor had to be a "diverse" product. It needed all the features that power users demanded. Yet it still needed to be easy enough for a broad range of users to implement.

Kildall asked Levin for a demonstration of Microsoft *Word* for MS-DOS. (This was version 4.0.) Levin showed off the outlining feature of *Word*, which he said distinguished the product from its competition. He pulled up a sample document–a product brochure–and showed the "outline view." If he wanted to look at the details of any one section, he could expand or collapse the outline accordingly. The outline was fully integrated into the word processor. This made it helpful when trying to reorganize big sections, because you could pick up one of the points on the outline and move it, which took along all of the accompanying text.

Levin also demonstrated the on-screen formatting features of *Word*. Part of the title was in italics. (As opposed to the earlier *WordPerfect* demo, *Word* actually displayed italics rather than representing them by using a different color.) Levin pulled up a list of different character formats that *Word* could display, such as double underlining and strikethrough. *Word* also enabled you to combine various formatting with a single macro key using what he called *style sheets*. He added that *Word* supported a number of PostScript fonts for the Apple LaserWriter printer. Kildall pointed out that unlike the other word processors demonstrated so far, *Word* used a bitmap in order to display the document formatting on-screen.

Cheifet asked Kesler how his product, *OfficeWriter*, could compete effectively against the more-established products like *WordPerfect* and *Word*. Kesler said *OfficeWriter* had seen the most success with Fortune 500 companies, and recently they had started focusing on resellers as well.

Kesler then provided a demonstration of *OfficeWriter*. The opening screen displayed a menu. Using the function keys, the user could select an action, such as creating or printing a document. Kesler showed how *OfficeWriter* could automatically draw lines or boxes around text–say to create an organizational chart–without the user having to create each one individually. Cheifet noted this didn't require the use of a mouse. Kesler said yes, you could simply use the numeric keypad. Kildall emphasized this particular demo was accomplished using *OfficeWriter*'s built-in macros.

Kildall asked about the "boilerplating" feature in *OfficeWriter*. Kesler said it was similar to marcos. Boilerplating allowed users to incorporate paragraph phrases and statements from other programs and bring them into your document. He provided a quick demonstration. Essentially, the boilerplate text was tied to a macro key.

Cheifet asked Kesler if there was any particular applications that *OfficeWriter* was unique for. Kesler said the product's emphasis had always been on connectivity and compatibility. *OfficeWriter* particularly shined when it came to graphics integration and desktop capabilities. The software was logical and intuitive to use yet still offered the features that power users demanded.

Word on the Mac Inched Closer to PageMaker

Wendy Woods returned for her second remote segment, reporting from TechArt, a San Francisco-based graphics design firm. (This was TechArt's second appearance; Woods previously featured the company in a 1985 episode on laser printers.) Woods noted that TechArt had been using Microsoft *Word* 3.0 for the Macintosh for several months. The program had received “rave reviews” from TechArt’s staff, who depended on good word processing programs to create professional documents.

Diane Burns, TechArt’s president, told Woods that the single feature most in demand that had been added to *Word* was a spelling checker. *Word* already had a spell checker on the IBM PC version. And now a version of it was brought over to the Macintosh in version 3.

Another important feature was the addition of style sheets, which Levin discussed in the prior segment on the PC version. Burns said the style sheets let her assign a complex format “spec” to a small code, and then attach that code to subsequent paragraphs so they would take on that formatting.

Woods said *Word* 3.0 was also exciting because it had elements found in a desktop publishing program. Graphics could be inserted, and page layout could even be previewed. Burns said she could place a graphic side-by-side with the paragraph that she selected. She showed a sample page layout (or print preview) screen. It wasn’t a replacement for Aldus’ *PageMaker*, as you could not edit the document in this mode, but it still provided the ability to do something that wasn’t possible before.

The Future of Word Processors

For the final segment, Michael Miller and Eric Alderman joined Cheifet and Kildall. Miller was executive editor at *InfoWorld*. Alderman was a columnist with *Computer Currents*. (Miller previously appeared in a May 1985 *Computer Chronicles* episode to discuss the Japanese computer industry.)

Kildall asked Miller how the marketplace was split up right now for word processors. Miller said the business marketplace was divided into three categories:

- The first was the “professional programs” that were very powerful and designed for people who did a lot of word processing. This group included *WordPerfect*, *WordStar*, *Word*, and *XyWrite*.

- The second group were the "office word processors." These were basically programs designed for secretaries and people writing memos, but not something like books. This group included *OfficeWriter*, *MultiMate*, and *DisplayWrite 4*.
- The third and final group were the "simple word processors." These products were very easy to learn. The main players here included Software Publishing Corporation's *Professional Write* and MicroPro International's *Easy*.

Miller added that a lot of these products had overlap. That is, they could read files created by other word processors.

Kildall asked Alderman if he saw word processors eventually morphing into desktop publishing programs. Alderman said he thought that they would. Word processing programs would eventually take on a lot of the more advanced features that we saw earlier in the program, such as Microsoft *Word*'s style sheets. User customization and laser printer support would also become important going forward.

Cheifet asked Miller and Alderman–both professional writers–which word processors they used. Miller said he split his time between *Word, WordPerfect*, and *WordStar*, running all three at different points. Alderman said he used *Word* and *WordPerfect*.

Apple Promotes IIgs as Rumors Swirl of New 32-Bit Macintosh OS

Stewart Cheifet presented this week's "Random Access," which was recorded in March 1987.

- The race was on between IBM and Apple to see which company would release the first 32-bit operating system for their new hardware platforms, the PS/2 and Macintosh II, respectively. Cheifet said that IBM had announced its new OS/2, but it wouldn't be available until 1988, so application software likely wouldn't be out until 1989. Meanwhile, Apple was reportedly working on a multi-tasking 32-bit operating system–code named "Juggler"–that could be released as early as summer 1987.

- The original developers of *VisiCalc* sued Lotus Development Corporation for $100 million, claiming that *Lotus 1-2-3* violated its "look and feel" copyright. Cheifet noted the ironic turn of events, given that Lotus was suing the developer of low-cost spreadsheet rival *VP-Planner* for copying the look and feel of *1-2-3*. (I'll discuss this story in detail in the next blog post.)
- First reports on the new IBM Model 30 were good. The Chicago Computer Society took a look at the new IBM 8086 machine and said it performed well and had an "amazingly quiet" hard drive. But Cheifet noted some retailers were already discounting the suggested $1,695 price for the computer.
- GRiD Systems announced a new AT-compatible laptop to compete with Toshiba's T3100. The GRiD 286 came with a 10 MB hard drive, a 720 KB floppy disk drive, and 640 KB of RAM. Cheifet said the price was $3,850.
- Paul Schindler reviewed *IS-2000* (Noumenon Corporation, $40), an integrated software package that included word processing, database management, spreadsheet, report generation, and mail merge using its own file system that worked in conjunction with MS-DOS.
- The Internal Revenue Service was looking into optical disk storage for its tax files. Cheifet said that California-based Integrated Automation signed a contract with the IRS to develop a sophisticated optical storage system called "Phaser," that would eventually digitize all tax records.
- Reader's Digest (finally) sold The Source to a New York venture capital firm. Cheifet said the new company also owned Automated Marketplace Systems, a firm specializing in electronic purchasing technology.
- CompuServe announced "bargain rates" through the end of May 1987. Access during the day would be offered at the lower evening and weekend rate of $6 per hour for 300-baud modems, and $12.50 per hour for 1200-baud modems.
- Apple prepared to launch a $1 million direct mail campaign to promote the Apple IIgs in home and

> educational markets. Cheifet said the campaign would involve sending "pop-up" cards that opened to show a 3D model of the IIgs.

Venture Capitalists Quickly Ousted OfficeWriter Founders

Since *WordPerfect* and Microsoft *Word* will continue to battle for word processor dominance over the next few years in our *Chronicles* timeline, I'll focus the remainder of this post on the two also-rans, *WordStar* and *OfficeWriter*. I'll start with *OfficeWriter* since that is the simpler story.

Jim and Mary Crist, a husband and wife from Madison, Wisconsin, founded Office Solutions, Inc., the company behind *OfficeWriter*. In late 1982, Jim Crist worked in technical support for Wang Laboratories, while Mary was a computer operator and programmer. In late 1982, they decided to develop their own word processing program for the IBM PC. Working nights and weekends for several months, they managed to create a working prototype by January 1983.

After demonstrating their word processor to local computer users in Madison, the Crists incorporated Office Solutions in April 1983. Jim Crist quit his job at Wang to focus on the new company as vice president of marketing. Mary Crist continued working as a consultant while also serving as vice president of finance. They brought in Jan Eddy to run the company as president. Eddy previously worked in data processing for Land's End, the Wisconsin-based clothing retailer.

OfficeWriter proved successful out of the gate. A 1986 article in Madison's *Capital Times* said Office Solutions reported $2.2 million in annual sales–a 30-fold increase over the first three years of operations. The company now employed 42 people and was on track to reach $4 million in sales by the end of the 1987 fiscal year.

Naturally, the success attracted venture capital. Eddy sought funding early in her tenure as president, which meant diluting the control that she and the Crists held in terms of stock and board seats. And while the company grew rapidly, it apparently wasn't rapid enough. Eddy later recalled that the directors representing the VCs created "financing and operational roadblocks," which prompted the Crists to look for a buyer.

In August 1988–just a couple of weeks after moving into a new 31,000 square-foot headquarters in Madison–Office Solutions was acquired by Software Publishing Corporation (SPC), a California-based company that published the word processing program *Professional Write*. SPC reorganized Office Solutions as Software Publishing Wisconsin. Eddy stayed on as general manager for a time but ended up leaving to join another husband-and-wife startup venture, Wingra Technologies.

For the next few years, the former Office Solutions continued to grow as Software Publishing Wisconsin. A June 1991 report in the *Wisconsin State Journal* noted the subsidiary now had 112 employees and reported annual sales of $30 million, which included both *OfficeWriter* and *Professional Write Plus*. Altogether, the Wisconsin office generated about 20 percent of Software Publishing's total revenues.

Alas, the good times didn't last. In 1994, SPC decided to close the Wisconsin office as part of a reduction of roughly half the company's workforce. By this point there were just 65 people employed in Madison. About half of them were reportedly transferred to another company that purchased Software Publishing Wisconsin's customer support operations. SPC itself didn't last much longer and was sold in 1996 to New Jersey-based Allegro New Media, Inc. (later renamed Vizacom).

WordStar's Founder Feuded with Venture Capitalist Backer

The history of *WordStar* began with Seymour I. Rubinstein. In the 1970s, Rubinstein served as director of marketing for IMSAI Manufacturing Corporation, which developed one of the earliest microcomputers, the IMSAI 8080. According to Rubinstein, he signed the first contract with Gary Kildall to bring the latter's CP/M operating system to the IMSAI machine.

In mid-1978, Rubinstein left IMSAI and together with a former colleague, John R. Barnaby, founded MicroPro International. Rubinstein said MicroPro's goal from the outset was to produce a word processing program for CP/M computers that could rival the standalone word processors sold by companies like IBM and Xerox. Those machines often cost upward of $15,000, so it made sense to develop a word processing application for the less-expensive micros.

While working at IMSAI, Barnaby developed an ASCII text editor called *NED*, which was designed as replacement for CP/M's *ED*. Barnaby used the knowledge he gained from creating that program to develop *WordMaster*, MicroPro's first word processing program. Together with a data sorting utility, aptly named *SuperSort*, Rubinstein debuted both programs at a September 1978 computer show in New York City, according to John C. Dvorak. Boosted by $12,000 in sales from that show, Barnaby and another programmer, Jim Fox, spent the next four months developing a more powerful word processing program–*WordStar*–which only kept about 10 percent of the *WordMaster* code. MicroPro formally debuted *WordStar* for CP/M at Jim Warren's 1979 West Coast Computer Faire.

WordStar was an immediate hit upon its 1979 release, generating $500,000 in sales during its first year on the market. By 1981, that figure jumped to more than $5 million. In March 1984, MicroPro International went public, raising $23.1 million in its initial offering.

Unfortunately, about two months before the IPO, Rubinstein suffered a serious heart attack. His health recovered, but Rubinstein later said that the key venture capitalist who had backed MicroPro, Fred Adler, used the medical emergency as a pretext to wrest control of the company from him. Rubinstein said that one of Adler's employees, H. Glen Haney, came to him in the hospital and demanded he sign documents converting Rubinstein's stock into non-voting shares. Otherwise, Adler would call off the IPO. Rubinstein said he signed under duress and resigned as CEO soon thereafter. Rubinstein remained chairman but Adler installed Haney as the new president and CEO.

Perhaps in an effort by Adler to do some damage control, a 1985 *Los Angeles Times* report suggested Rubinstein's ouster was justified by his management of MicroPro International during its early period of rapid growth:

> "Everything that made him a great entrepreneur made him a failure as a manager," said [former MicroPro marketing director Will] Luden, who describes himself as an admirer of his former boss.
>
> The company continued to hire "inspired amateurs" as it grew, he said, rather than the business specialists that it needed. Budgeting was inadequate, so that when the company began losing money in 1982, officials were not sure whether it was from overstaffing or because other costs were too high, Luden said.
>
> "We'd slap a hiring freeze, or go on a cost-cutting campaign, without really knowing," said Luden. "We didn't know where the hemorrhage was, so we slapped a bandage across the whole body."

Now as we'll see, Adler appeared to be just as much in favor of this managerial chaos as Rubinstein–in fact, he was almost certainly behind it–but there was no doubt that MicroPro's periodic cost-cutting campaigns proved more harmful than helpful. Indeed, one particular round of employee cuts ended up creating a major problem for MicroPro and *WordStar* in the form of a new competitor. In 1982, MicroPro laid of three of its programmers–Peter Mierau, Stan Reynolds, and Richard Post–shortly after Mireau completed a hasty rebuild of Barnaby and Fox's original CP/M codebase for *WordStar*, which was somehow lost. (Barnaby had left the company in late 1979.) Stung by the disloyalty, the three men decided to create their own company to produce a *WordStar* clone.

The programmers quickly found an ally in future *Computer Chronicles* contributor George Morrow, who agreed to invest $100,000 in capital in the new venture, which was named NewStar. This wasn't an act of altruism on Morrow's part. Like a lot of CP/M computer makers, Morrow Designs often sold their machines pre-bundled with application software. Morrow had been bundling his machines with *WordStar*. So by investing in this new clone venture–in exchange for a free license–Morrow stood to save quite a bit of money for his own business.

In September 1983, NewStar released *NewWord*, a word processor that mimicked about 80 percent of *WordStar*'s functionality. This was quickly followed up in 1984 with a 2.0 *NewWord* release that added a number of features that were missing from *WordStar*, such as an undelete function, a spelling checker, and laser printer support.

Meanwhile, MicroPro struggled to update its aging *WordStar*. Before his ouster, Rubinstein decided to purchase a UNIX-based *WordStar* clone developed by Edward de Jong, which was used as the base for a completely revamped *WordStar*. With de Jong as the lead programmer, MicroPro released this new *WordStar 2000* in 1985.

To be clear, *WordStar* and *WordStar 2000* had little in common other than the fact they were both word processing programs published by MicroPro. *WordStar 2000* used a different file format and a more simplified command structure than classic *WordStar*. Of course, *WordStar 2000* also added a number of features missing from the older application. MicroPro also released an even more simplified word processor called *MicroPro Easy* to cover the lower end of the market.

The problem was that many of the new features in *WordStar 2000* were also available in *NewWord*–and existing *WordStar* users didn't have to learn a new interface. Not surprisingly, many legacy *WordStar* users moved over to *NewWord*. At the same time, users looking for a simpler interface not burdened by 1970s programming standards flocked to *WordPerfect*.

Indeed, WordPerfect executives were just as befuddled by MicroPro's stumbles with *WordStar 2000* as everyone else. W.E. "Pete" Peterson, then WordPerfect Corporation's executive vice president, wrote in his memoirs that sales of *WordPerfect* 4.0 benefited immensely from MicroPro's decision to destroy its credibility with its most loyal customers:

> [W]ord processing users had a religious-like zeal for their favorite products. For most people, switching from one product to another was almost unthinkable. WordStar was especially hard to learn and master, and fans of the product defended it with an irrational fervor. Their loyalty was similar to that of a mother who has given birth to a very ugly baby. It was almost impossible to get expert WordStar users to admit their product had any flaws.
>
> The diehard WordStar users pushed their word processor on unsuspecting friends and co-workers, and this very vocal group represented our biggest obstacle to convincing new customers to buy our product. Luckily, Micropro made our job easy by attempting to replace WordStar with WordStar 2000. Micropro tried to fix all the problems in the original WordStar, and rather than making their loyalists happy, they alienated them. Their strongest supporters had bonded to the program's quirks and problems and had come to believe that the difficulties were desirable. Worst of all, WordStar 2000 was very slow compared to the old WordStar. Even a mother could not have loved the new product.

During this crucial 1985-1986 period, *WordPerfect* started to overtake *WordStar* and never looked back. MicroPro panicked. Well, Fred Adler panicked. He ousted Haney, his handpicked CEO, in August 1986 and brought in an industry outsider, Leon Williams, to take over as president. Adler also laid off about 20 percent of the MicroPro staff for good measure.

Williams' first priority was to try and regain the trust of the *WordStar* customers burned by the *WordStar 2000* debacle. To accomplish that, he ended up buying MicroPro's main competitor for those same customers–NewStar. Walter Feigenson, who had joined NewStar as its vice president of marketing, helped negotiate the sale of the company to MicroPro for $3 million, which was announced in October 1986. As part of the deal, Feigenson and several key NewStar employees, including co-founder Peter Mierau, received one-year contracts to stay on at MicroPro.

WordStar 4.0, the product that Feigenson demonstrated in this *Chronicles* episode, was effectively the final *NewWord 3.0* code combined with some elements from the last release of the classic *WordStar*. The new-old *Wordstar* proved successful enough to put MicroPro back into the black. The company reported a $2.9 million profit in 1987 after sustaining a $1.2 million loss in 1986.

But in 1988, MicroPro slipped back into the red with a $5.1 million loss. Fred Adler reacted as you might expect. He fired Leon Williams in October 1988 and announced another round of 20-percent layoffs that December. Adler promoted chief operating officer Gari Grimm to take over as president and CEO. One of Grimm's first moves was to change the company's name from MicroPro International to WordStar International.

Grimm didn't last long either. She resigned in October 1990 after WordStar reported yet another quarterly loss. The company continued to limp along until February 1994, when WordStar disappeared in a bizarre three-way merger with Spinnaker Software Corporation and SoftKey Software Products Inc. The story of that deal will almost certainly be the subject of a future post.

Notes from the Random Access File

- This episode is available at the Internet Archive and was first broadcast around March 24, 1987.

- Walter Feigenson left MicroPro after his one-year contract expired, which was not long after this *Chronicles* episode was first broadcast. Feigenson spent three years at Ashton-Tate and after that held a number of marketing executive jobs until he retired in the early 2010s.
- Dan Lunt remained with WordPerfect Corporation until 1993. In 1998, he co-founded Logio, Inc., where he also served as CEO. Logio was a multilingual search engine targeting business professionals. Lunt took Logio public before selling the company in October 2000 to Pacific Web Works Inc., in a stock swap. In the 2010s, Lunt held a number of executive positions with various energy startups, most recently with DiVi Energy, LLC.
- Lewis Levin spent 23 years at Microsoft, at various points overseeing *Excel* and *Microsoft Office*. During the 1990s he headed the company's desktop finance division, which was responsible for *Microsoft Money*, and in 1999 was named president of TransPoint, a joint venture between Microsoft, First Data Corporation, and Citibank to provide electronic bill payment services. Levin retired from Microsoft in 2008 and later started the nonprofit Winter Cove Foundation.
- Bob Wallace, one of the original Microsoft employees, wrote *PC-Write* shortly after leaving the company in 1983. Wallace developed the shareware program through his company Quicksoft, Inc., which he sold to another former Microsoft employee, Leo Nikora, in January 1991. Wallace continued working for Quicksoft as a developer after the sale and released a final *PC-Write* update that June.
- Apple did technically beat IBM to market with its "32-bit" operating system. Apple released System Software 5 for the Macintosh in October 1987, which included *MultiFinder*, the multi-tasking feature previously code-named "Juggler." IBM released OS/2 a few weeks later, in December 1987.
- *IS-2000* was created by Martel Firing, a self-employed software consultant based out of Alameda, California. Firing marketed the product through his company, Noumenon Corporation, which he founded in 1983. The few mentions I could find of the product referred to it as *Intuit IS-2000*. I don't think there's any connection with

Intuit Corporation, the publishers of *Quicken*. *IS-2000* remained on the market until at least 1988, and it appears Noumenon went defunct in 1989.

- There are two additional sources I'd like to credit with respect to WordStar: A May 2005 oral history that Seymour I. Rubinstein gave to the Computer History Museum, and an archived version of an extensive history of WordStar prepared by Michael Petrie.

Chapter 10: Lotus HAL, What'sBest!, VP-Planner, Javelin Plus, and Silk

In 1978, Harvard Business School student Dan Bricklin started thinking about creating an electronic spreadsheet program. That summer, Bricklin decided to try and make his idea a reality. He developed a prototype on an Apple II that he borrowed from Dan Fylstra, who had received his own Harvard MBA the year before and founded a company called Personal Software.

After completing the prototype and showing it to Fylstra, Personal Software agreed to publish the program. Bricklin and a fellow programmer, Bob Frankston, formed their own company, Software Arts, to serve as the developer. Personal Software would then handle marketing and sales and pay royalties to Software Arts.

Bricklin initially named his spreadsheet program *Calcu-ledger*. Fylstra decided that *VisiCalc* was a better name. In May 1979, Fylstra ran the very first ad for the new program–actually, a teaser–in *Byte* magazine, where he had been one of the original editors. That same month, Personal Software held the first public demonstrations of *VisiCalc* at Jim Warren's West Coast Computer Faire in San Francisco.

VisiCalc quickly emerged as the first system-selling app for the Apple II platform, although it was later ported to other machines. This got the attention of IBM. As *Computer Chronicles* regular George Morrow later wrote, "IBM came into the personal computer market when Apple threatened their base–when they saw Apple start selling into business, into the corporate environment, especially to run *VisiCalc*."

Bolstered by *VisiCalc*'s success, Personal Software renamed itself VisiCorp and expanded the brand to cover additional software products, including *VisiOn*, the subject of the second-ever *Chronicles* episode broadcast in 1983. But around this time, the relationship between VisiCorp and Software Arts soured and ended up in litigation. To make a long story short, the litigation ended up destroying both companies and *VisiCalc*. VisiCorp merged into Paladin Software Corporation in late 1984, with the surviving entity retaining the Paladin name. Meanwhile, Software Arts ended up selling its assets to Lotus Development Corporation in 1985.

The Age of 1-2-3

Lotus, of course, published *Lotus 1-2-3*, which in the mid-1980s superseded *VisiCalc* as the dominant computer spreadsheet program. Mitch Kapor, the founder of Lotus Development, had actually worked for VisiCorp. In fact, Dan Bricklin and Bob Frankston referred Kapor to VisiCorp to publish *Tiny Troll*, a statistical analysis program that Kapor wrote for the Apple II.

Much like Bricklin and Frankston, however, Kapor's relationship with VisiCorp eventually went south. At least Kapor managed to get a $1.8 million buyout of his contract for his efforts. That money helped him start Lotus Development, which released the first version of *1-2-3* for the IBM PC in the fall of 1982.

Kapor later recalled that the immediate success of *1-2-3* "came as an enormous surprise." In 1983, Lotus reported sales of $53 million. The following year, that figure nearly tripled to $156 million. The company itself grew from 20 to 750 employees during that two-year period.

By March 1987, when this next *Computer Chronicles* episode aired, *1-2-3* was the undisputed king of the business software market. This particular episode was the second in a four-part series on business applications and the first of two shows focused on spreadsheets. Stewart Cheifet opened the program by showing Gary Kildall a copy of the late, lamented *VisiCalc* running on an Apple IIc. He asked Kildall how *Lotus 1-2-3* came to replace

VisiCalc as the dominant spreadsheet program. Kildall said the Apple II was always accepted in education and *VisiCalc* brought it into the business market as well. *Lotus 1-2-3* came out right after the launch of the IBM PC and used the power of that machine to improve the spreadsheet model and added graphics and database functionality. So it really became the standard on the PC before the competition hit. As a result, a number of third-party developers started making *1-2-3* add-ons.

Moving 4Word with Lotus Add-Ins

Wendy Woods presented her lone remote segment for the week from the San Mateo, California, office of the investment firm Dean Witter Reynolds. Woods said that Dean Witter's brokers relied on computers for a variety of tasks, from transmitting exchange-floor trades to managing financial portfolios. Over some B-roll footage, Woods explained that investment counselor David Huggins used *Lotus 1-2-3* to manage his clients' accounts.

Since numbers could be added or changed by more than one person, Woods said, Huggins installed a notation program called *Note-It*, which attached notepad windows to individual spreadsheet cells. The notes could add details or clarify changes made by other users.

Note-It was part of a group of programs commonly called "add-ins," Woods said, which operated within the spreadsheet environment. Add-in developers claimed these enhancements were different from pop-up, memory resident programs because they were developed in cooperation with the original software developer–in this case Lotus.

Woods said the add-in concept could be seen as a new approach to "integrated software": Instead of writing a word processor with math functions, why not give a spreadsheet the ability to manipulate text? Along with *Note-It*, the Dean Witter office also installed *4Word*, a word processing add-in. Calling up *4Word* shipped you to a word processing screen, with the added function of integrating numbers right off the spreadsheet. Changes made to the spreadsheet were then ported to the *4Word* document as well.

One of the newest additions to the add-in category, Woods continued, was the spelling checker, which helped you weed out embarrassing errors, although it wouldn't correct your math.

Add-ins may not have all the features of your favorite software package, Woods concluded, but as alternatives to a library of uncooperative programs, they offered a clever way to add functions to your existing software at a very modest price.

Could 1-2-3 Handle Natural Language and Applied Mathematics?

Larry Gross and Sam Savage joined Cheifet and Kildall for the next segment. Gross was a software consultant with Lotus Development and co-developer of a *1-2-3* add-on called *HAL*. Savage was chairman of Illinois-based General Optimization, the publisher of another *1-2-3* add-on called *What'sBest!* (Yes, that's how it's spelled.)

Kildall opened by asking for a definition of an "add-on." Gross said it was a product that enhanced the functionality of *1-2-3*. Kildall asked if these were considered "terminate and stay resident" (TSR or RAM-resident) programs. Gross said *HAL* was not a TSR program. Rather, when you loaded *HAL* , it also loaded *1-2-3*. Similarly, when you closed *HAL*, you also closed *1-2-3*.

Kildall asked for a demonstration of *HAL*. Gross pulled up a blank *1-2-3* worksheet. With *HAL*, you could push the backlash key to pull up a request box. In that box, the user could type English phrases to perform operations. So if you typed `get quotas`, *HAL* would retrieve a file called `quotas`. In that file, you could then ask for a column total by simply typing `total this column`. *HAL* also included an undo function activated by pressing the backspace key. (This worked on both *HAL* and native *1-2-3* commands.) Gross said you could also produce a graph by typing `graph this`, and *HAL* figured out all of the ranges and axis labels automatically. Cheifet asked if the program followed some set of default parameters. Gross said yes.

Gross then showed how you could perform a database operation using *HAL*. He pulled up a sample database of baseball players and their statistics. If you wanted to find out which players had more than 30 home runs, you could just type `who has more than 30 hr` into *HAL*. You could also use it to conduct a simple search. For instance, typing `find 11` would show the first occurrence of the number 11 in the database.

Kildall, always skeptical of this sort of thing, clarified that *HAL* didn't take just any natural language. The queries had to be made in a specific format. Gross said yes, there was some syntax the user had to learn. But it was easy to pick up since it was very "English-like." He added that *HAL* could also be used to build worksheets from scratch. For example, you could type `put months across` and *HAL* created a row with the names of each month from January to December. (Gross provided several more examples of this feature, which I won't recount here.)

Cheifet turned to Savage and asked about his program, *What'sBest!* What did it do? Savage said the program took the mathematical concept of linear programming and applied it to solving particular business problems using *1-2-3*. He pulled up a sample. In this case, a police department had a "non-uniform" staffing requirement. That is, the department needed 180 people on Monday, 160 people on Tuesday, and so forth. In addition, the police had to be hired on a five-day basis, so if you hired 180 police on Monday, they worked straight through until Friday. But then you were short 10 people on Friday, and 130 people on Saturday. But this in turn meant you'd be overstaffed the following week. You could use *Lotus* to sort all this out, Savage said, but it was like playing a Rubik's Cube on the screen. Instead, using *What'sBest!* could help you create an appropriate staffing model.

Savage pulled up *What'sBest!* by hitting the asterisk key. This brought up a help menu over the *1-2-3* interface. *What'sBest!* took over the 10 function keys on the PC and effectively contained all of the program's commands. Hitting `F1` would "optimize" the worksheet. This basically meant exporting the *Lotus* worksheet into *What'sBest!*, which then applied a linear programming technique.

Perhaps as confused as the rest of us, Cheifet asked what exactly was being "optimized". What was the program trying to accomplish? In this case, Savage said, the program was trying to minimize the total cost of staffing. Here, *What'sBest!* found a way to reduce the staffing cost from $64,000 to $44,000. Cheifet pushed for more information on the "underlying theory" used by the software. Savage said it was based on 40 years of applied mathematics research that you really didn't want to know about. It was very technical stuff that the program tried to hide from the user.

Why Have a Spreadsheet When You Can Have a Multidimensional Database?

Adam Osborne joined Cheifet and Kildall for the next segment. Osborne–a prior *Chronicles* guest–was the president of Paperback Software International (PSI), which published *VP-Planner*, a low-cost spreadsheet program that competed with *1-2-3*.

Kildall noted that everyone had seemingly accepted *Lotus* as the standard spreadsheet. And *VP-Planner* was similar to *Lotus*. He asked Osborne to explain the program. Osborne said that *VP-Planner* was a multidimensional database with *dBASE* file capabilities. The spreadsheet portion of *VP-Planner* was the user interface. And it happened to be a "Lotus work-alike," so if you had any *Lotus 1-2-3* templates, worksheets, or macros, it would run under the *VP-Planner* spreadsheet. That said, *VP-Planner* also had its own powerful and unique database capabilities.

Osborne that provided a demonstration of *VP-Planner*, using a multidimensional database for a hypothetical computer store. In this example, the store kept its accounting information by time and divided by product and salesperson. He said you didn't have to limit the database to just "dumb entry" of data. You could also program the database's logic and equations. This meant you could consolidate information–say totaling up quarterly sales figures for the year–within the database and not have to use the spreadsheet. So if you used *VP-Planner*, you never would have to worry about linking spreadsheets or run into problems with large spreadsheets. Osborne noted that *Lotus* really didn't have a database. The only data in *1-2-3* was what was in the spreadsheet. But with *VP-Planner*, you kept data in a multidimensional database on the disk. You could then write spreadsheets to perform specific tasks using the database. Osborne said you could also use *VP-Planner* to create *dBASE*-compatible database files.

Cheifet pointed out the retail price of *VP-Planner* was just $100. How could Osborne sell this product for $100 when the competing products were $500 or more. Osborne said the best programmers worked for themselves and not other companies. PSI did not develop *VP-Planner*. Outside authors brought the product to him and he paid them a royalty. PSI's role was simply writing the manual and refining the user interface. The authors then used their royalties to keep updating and improving the software in the future. Using this business model, Osborne said PSI only ran on 35 employees while the competition–I assume he meant Lotus Development–had 1,000.

Competitors Cut Prices to Compete with Lotus

For the final segment, Robert Firmin and Eric Gaer joined Cheifet and Kildall. Firmin was chairman and CEO of Javelin Software, which produced *Javelin Plus*. Gaer was vice president of marketing with Daybreak Technologies, Inc., which produced *Silk*.

Kildall noted that Firmin's company recently had an "unusual price change" with respect to its spreadsheet program, *Javelin Plus*. The price went from $700 to $100 and then back up to $200. What was the background of that? Firmin said that the biggest marketing obstacle that Javelin faced was the entrenched *Lotu 1-2-3* user base. To get around that, Javelin decided to "cede" the market at $100 for two-and-a-half months. He said that worked exceedingly well and now *Javelin* had one of the larger worldwide install bases. So now they'd settled on $200 as a longer-term price.

Turning to Gaer, Kildall asked about his company's product, *Silk*, which was another "Lotus-like" spreadsheet. Could Gaer explain his product? Gaer said that *Silk* recognized the dominance of *Lotus* in the marketplace and its large installed base. *Silk* therefore used a similar user interface and performed about 99 percent of the same functions as *1-2-3*. But *Silk* also added some advanced features.

Cheifet asked for a demonstration of *Silk*. Savage said *Silk* was a straightforward spreadsheet, and the most common application was the time-series model–i.e., analyzing a sequence of data points in time order. Users could build a time-series model in *Silk* using "essentially" four keystrokes. These commands defined the period and the fields. The fields could be defined in English, and all of the relationships were automatically linked. *Silk* also had an integrated help system that "followed" the user around as they worked on their spreadsheet–a feature that Savage claimed no other help system possessed. Additionally, there was a way to validate the spreadsheet, so if you changed a cell, the worksheet would alert the user to any problems. The help system would then explain the problem and how to fix it. Cheifet said it was similar to a spelling checker in a word processor.

Cheifet asked about the "recovery" function in *Silk*. Savage explained that the program logged and kept track of each keystroke made. So if unsaved data was lost–due to say a power outage or a sudden reboot–the user could recover those keystrokes.

Turning back to Gaer, Cheifet asked about his program, *Javelin Plus*. Gaer said the premise of *Javelin* was that the most important thing in any business analysis was not calculating numbers, but rather being unable to understand your business and communicating your analysis to someone else. To illustrate, Gaer pulled up a sample *Javelin* screen. On the top of the screen there was a spreadsheet table showing the cash and cash balances for a hypothetical business. On the bottom, there was a graph, which was automatically updated as the user selected different cells on the spreadsheet. He then switched to a "diagram" view, which showed how cash flowed into the business over a period of several months. There was also a "chart" view that allowed the user to change the shape of the graph directly. This meant the user could effectively add data without typing in any formulas. Gaer added that *Javelin* also had the capability to build as many dynamically linked worksheets as the user needed. And each worksheet required very little memory.

Microsoft, Borland Join PC Spreadsheet Wars

Stewart Cheifet presented this week's "Random Access." Although this episode had an original airdate in March 1987, the program uploaded to the Internet Archive was a rerun from October 1987, so that is the date for these items.

- Microsoft released a PC version of *Excel*, its spreadsheet program originally written for the Macintosh. The PC *Excel* had a graphical user interface that took advantage of the new graphics capabilities of IBM's PS/2 computers. Cheifet noted that some critics said the PC version of *Excel* was slower and less robust than the original Macintosh version.
- In response to Microsoft, Lotus Development said it would release a Macintosh version of *Lotus 1-2-3* in early 1988, with more details forthcoming at the January 1988 Macworld Expo in San Francisco.
- Lotus also announced an "enhancement" called *Speed Up* for *1-2-3* that promised to "speed up" the time needed for spreadsheets to recalculate numbers. Cheifet said this move was in response to Borland's *Quattro* spreadsheet, which critics said was a faster program. Users could get *Speed Up* for free for some dealers, or directly from Lotus for $20.
- Cheifet noted that despite the new competition in the spreadsheet market, one longtime *1-2-3* user said that for a new program to replace Lotus, it would have to "cure cancer, taste like chocolate, and sell for a dollar."

- Despite what Cheifet described as a “shaky reception,” sales of the IBM PS/2 computers were doing well, and that IBM would ship the one millionth unit this month. But while IBM said PC sales were up 40 percent from 1987, analysts noted Big Blue’s share of the overall market was still falling due to the “continuing assault of the clones.”
- Epson re-entered the laptop market with the Equity LT, a 640KB DOS machine with a backlit screen that would retail for $1,895 (or $2,995 with a hard disk).
- Paul Schindler reviewed *TimeSlips* (North Edge Software Corporation, $100), a program for time-based billing. Schindler called it the “best, cheapest professional time billing program we’ve seen.” He also noted its use of color.
- The U.S. House of Representatives telecommunications subcommittee began hearings on a Federal Communications Commission proposal to raise telephone access charges for users of online services. FCC Commissioner Dennis Patrick testified in favor of the rate hike, saying online users would simply be paying the same rates as long-distance telephone callers. But Massachusetts Rep. Ed Markey testified against the hike, saying it would inhibit the growth of online services so that only the wealthy could access them.
- October 1987 was “Computer Learning Month,” a Software Publishers Association-backed celebration of the use of computers in the classroom.
- A new “decision support software” called “Ask God” was purportedly an artificial intelligence program that used the text of the King James Bible to give users advice on their moral conduct.

Javelin Failed to Rise Above Lotus’ Market Share

In the previous blog post, I said that you could divide the history of word processors into three distinct periods based on platform transitions: *WordStar* in the pre-IBM PC period, *WordStar* in the DOS period, and Microsoft *Word* in the Windows period. The spreadsheet market saw a similar pattern: *VisiCalc* in the pre-IBM

PC period, *Lotus 1-2-3* in the DOS period, and Microsoft *Excel* in the Windows period.

That said, *Lotus 1-2-3* had a similar problem to *WordStar*, namely its complicated user interface. While *WordStar* relied on obscure text commands, *1-2-3* was all about the menus. So many menus, in fact, that Stewart Cheifet even commented on it during a "Random Access" item announcing the launch of *HAL*:

{{< youtube 2Zoy1UOHz24 >}}

Lotus did not originally develop *HAL*. Larry Gross and his brother, Bill Gross, were CalTech graduates who started GNP Development corporation in November 1984. Previously they built a company that developed and sold loudspeakers in the Los Angeles area. After IBM introduced the PC, the Grosses pivoted into software consulting for professional accountants and small business customers looking to use *Lotus 1-2-3*.

This consulting work led to GNP. The Gross brothers decided to try and develop a simpler *1-2-3* interface that used English-language commands. GNP announced the final product–named *HAL* after the killer AI from *2001: A Space Odyssey*–in October 1985. Two months later, Lotus Development acquired GNP and the Grosses continued their work under Lotus itself.

Media coverage of the deal suggested that Lotus acquired *HAL*, at least in part, due to competitive pressure from the recently released *Javelin*, which had received favorable reviews as a more modern spreadsheet than the aging *1-2-3*. Indeed, Javelin president Stanley Kugell told the *Boston Globe* that he believed *HAL* would prove to be too little, too late:

> The results of *HAL* in a demonstration look great, but natural-language products are just not flexible to handle real business problems. The problem is that *Lotus 1-2-3* is based on seven-year-old technology and is near its limits. It's like having a horse and needing something more powerful. Why get a bigger horse when you can buy a car?

Unfortunately for Kugell, fewer people were buying his shiny new car than Lotus' decrepit old horse. Kugell co-founded Javelin Software Corporation with Robert Firmin in January 1983. *Javelin* initially grabbed headlines after making distribution deals with IBM and database giant Ashton-Tate. But *Javelin* as a product always faced an uphill climb.

For one thing, it was more expensive than *Lotus 1-2-3*. *Javelin* initially retailed for $695 at a time when *1-2-3* was just $495. This forced Javelin Software into trying a number of pricing strategies. In April 1986, Javelin released a "trial version" for $20. A month later, it announced large discounts on group licensing. And a few months after that, there was the gimmick that Gary Kildall mentioned–Javelin offered 10,000 copies at $99.95 before raising the price to $200.

None of this worked, at least in terms of gaining market share. By some estimates, *Javelin* had an installed base of only about 60,000 users at its peak. On top of that, Javelin Software had a disastrous 1987 in terms of obtaining new capital. That summer, the company announced a $7.5 million public offering of stock. But the sale was canceled in the aftermath of the October 19, 1987, stock market crash.

Firmin and Kugell then started looking for a buyer to take the sinking company off their hands. In February 1989, Information Resources Inc. (IRI), a Chicago-based company that developed software applications for consumer goods manufacturers, purchased Javelin Software. IRI apparently continued to sell *Javelin* in the United Kingdom for a short time before integrating the product into its own *PC Express* software package.

Osborne Fought Lotus in Court–and Lost Badly

Lotus may not have faced a serious threat from *Javelin*, but that did not mean the company took "work-alike" competitors like Adam Osborne's *VP-Planner* lightly. To the contrary, Lotus pursued an aggressive litigation strategy against a number of its remaining competitors, all premised on the notion that the overly complex menu structure of *1-2-3* was itself a form of expression protected by copyright.

To be clear, Osborne didn't necessarily set out to make a Lotus clone. Fresh off the demise of Osborne Computer Corporation, Adam Osborne decided to shift from hardware to software for his next startup. In September 1983, he incorporated E.V.E. Computer Corporation in California. He then waffled on the name, changing it first to Software Seed Capital Corporation and then Paperback Software International (PSI). PSI publicly announced its launch in March 1984.

Essentially, PSI's business model was to sell discount software through non-traditional retailers, such as bookstores, that didn't require employees to receive specialized training. As Osborne indicated on the program, PSI wouldn't develop software but rather acquire it from individual programmers who would then receive royalties. (Osborne didn't invent this model, mind you, as companies like Broderbund and Electronic Arts operated in a similar manner in its early days.)

In the case of *VP-Planner*The program originated with a programmer named James Stephenson. Much like Mitch Kapor with *Lotus 1-2-3*, Stephenson had seen the limitations of *VisiCalc* and set out to make his own spreadsheet program. Stephenson began work on his program in 1982 under the name *FIPS* (or "Financial Information and Planning System.")

The original *FIPS* prototype used a menu and command structure that was substantially different from the *1-2-3* interface (which in turn borrowed heavily from the *VisiCalc* interface). By late 1983, Stephenson changed the name of his program from *FIPS* to *VP-Planner* and signed a publishing deal with PSI that December.

As development continued on *VP-Planner* in 1984, however, Stephenson and Osborne decided that in order to be commercially successful, it was necessary to "ensure that the arrangement and names of commands and menus in *VP-Planner* conformed to that of *Lotus 1-2-3*," Stephenson later recalled. This basically meant turning *VP-Planner* into a *1-2-3* clone–or "work-alike" as Osborne called it on *Chronicles*. As Stepehson put it, his original interface was completely overhauled to ensure that the *Lotus* menus and macros would work exactly the same in *VP-Planner*.

In January 1987–a few weeks before this *Chronicles* episode first aired–Lotus Development sued PSI for copyright infringement. Lotus also sued Mosaic Software, Inc., a company that produced its own *1-2-3* work-alike called *The Twin*. Initially, there was a significant amount of backlash within the industry against Lotus. Jon A. Shirley, Microsoft's president, told the *New York Times* that a Lotus victory would set a bad precedent for the entire software industry: "I would hate to feel that this would get to a point that everyone sues everyone." Even Dan Bricklin, the original co-author of *VisiCalc*, told the *Times* that copying basic concepts was inherent in software development, noting, "We all borrow the best from others. That's what progress is all about."

Jim Manzi, who became Lotus Development's CEO following founder Mitch Kapor's sudden resignation in 1986, understandably didn't share these concerns. He chastised his competitors for "imitating rather than innovating," and insisted that adding new features on top of the *1-2-3* menu structure was akin to "plagiarizing *Gone with the Wind* and then merely adding a new concluding chapter."

The reality, I suspect, was that Manzi was playing defense rather than offense. *Lotus 1-2-3* was still the dominant spreadsheet on the PC platform in 1987. But Microsoft had already proven a GUI-based spreadsheet could work on the Macintosh. And as the PC market started to move into the era of machines based on the 32-bit Intel 386, it was only a matter of time before graphical interfaces and applications would render the byzantine command structure of *1-2-3* a historical relic. Time was not on Lotus' side.

Of course, time is also the fire in which litigation burns very slowly. Lotus Development's lawsuit against PSI did not go to trial until 1990. U.S. District Judge Robert Keeton of Massachusetts tried the case without a jury. The trial had been scheduled to take place in two phases. During phase one, which took place in February 1990, Keeton heard testimony and evidence regarding whether Lotus could assert copyright protection for the menu and command structure of *1-2-3*, and if so, whether PSI had infringed said copyrights.

Beeton issued his decision on June 28, 1990. He ruled in favor of Lotus on both counts. Beeton rejected PSI's position that the *1-2-3* the user interface was purely "functional" and therefore not eligible for copyright protection. Citing the testimony of multiple expert witnesses at trial, Beeton wrote:

> [T]he bulk of the creative work is in the conceptualization of a computer program and its user interface, rather than in its encoding, and that creating a suitable user interface is a more difficult intellectual task, requiring greater creativity, originality, and insight, than converting the user interface design into instructions to the machine.

Beeton reasoned that since a "menu command structure" could theoretically be expressed "in many if not an unlimited number of ways," the particular arrangement of the *1-2-3* menu structure was an "original and nonobvious" form of expression entitled to copyright protection. And PSI had clearly copied the *1-2-3* menu structure. Beeton further rejected PSI's argument that it had to mimic the Lotus structure to maintain functional compatibility:

> [F]irst, as *Excel* has proved, a spreadsheet program did not have to be exactly compatible with *1-2-3* in order to be a commercial success. Second, copying the menu structure was not the only way to achieve aspects of this desired compatibility. For example, defendants could have instead added a macro conversion capability as the creators of *Excel* have successfully done (the *Microsoft Excel Macro Translation Assistant*), and could have provided an on-line help function that would show users the *VP-Planner* equivalent for 1-2-3 commands.

Given all this, Beeton said it was "indisputable" that PSI infringed Lotus Development's copyright. The second phase of the trial was scheduled for November 1990 and would have determined the amount of damages that PSI owed Lotus. But PSI decided it wasn't worth the effort. In October, the parties announced a settlement. PSI–well, its insurance company–agreed to pay Lotus $500,000 and remove all remaining copies of *VP-Planner* from the market.

The settlement effectively marked the end of PSI. Adam Osborne actually stepped down as the company's president just before the trial began in February 1990. A couple years later, he moved back to his native India to live with his sister and, after a long period of declining health, died in March 2003 at the age of 64. As for PSI, it stopped filing corporate reports with the State of California after 1990 and appears to have gone defunct around 1993.

Borland Gives Lotus Its Comeuppance

Four days after Judge Beeton's decision in the PSI lawsuit, Lotus continued its litigation rampage by suing Borland International, the developers of the spreadsheet *Quattro Pro*. (Stewart Cheifet briefly mentioned its predecessor, *Quattro*, which came onto the market in 1988.) Unlike *VP-Planner*, *QuattroPro* had seriously eaten into Lotus' market share. But Jim Manzi and his lawyers believed that Judge Beeton's decision in the PSI case would help defeat yet another competitor.

And it did, at first. This case was also assigned to Beeton. In July 1992, Beeton granted Lotus partial summary judgment on the issue of whether the Lotus menu command structure was copyrightable. Just as he found in the PSI lawsuit, he said it was. Beeton also held that Borland infringed this copyright because it was undisputed that *Quattro Pro* used many of the same menu commands and structures as *1-2-3*. But he also found that Borland did not copy the entire *1-2-3* interface. As such, he reserved the question of the scope of Borland's infringement for a jury trial.

In response to Beeton's ruling, Borland removed the feature of

Quattro Pro that emulated the Lotus menu structure. But Borland retained a separate feature known as a “Key Reader” that could read and understand some macros written for *1-2-3*. Lotus maintained this still violated its copyright.

Beeton agreed. After a two-phase bench trial, he determined that the Key Reader still copied the *1-2-3* command structure, even though it no longer used the exact Lotus command names, only the first letters of each command. Accordingly, Beeton issued a permanent injunction against Borland.

Unlike PSI, Borland appealed–and won. In March 1995, a three-judge panel of the U.S. First Circuit Court of Appeals in Boston reversed Judge Beeton’s decision. More to the point, the appellate court rejected the very idea that the Lotus menu command structure was protected by copyright in the first place.

Circuit Judge Norman H. Stahl, writing for the panel, agreed with Borland that the menu structure was a “method of operation,” which was not eligible for copyright protection. Stahl rejected Beeton’s characterization of the “expressive choices” made by the Lotus developers in creating their menus as barring any other spreadsheet publisher from making similar choices in their own designs:

> The fact that Lotus developers could have designed the Lotus menu command hierarchy differently is immaterial to the question of whether it is a “method of operation.” In other words, our initial inquiry is not whether the Lotus menu command hierarchy incorporates any expression. Rather, our initial inquiry is whether the Lotus menu command hierarchy is a “method of operation.” Concluding, as we do, that users operate *Lotus 1-2-3* by using the Lotus menu command hierarchy, and that the entire Lotus menu command hierarchy is essential to operating *Lotus 1-2-3*, we do not inquire further whether that method of operation could have been designed differently. The “expressive” choices of what to name the command terms and

> how to arrange them do not magically change the uncopyrightable menu command hierarchy into copyrightable subject matter.

Lotus–which was acquired by IBM a few months after the First Circuit's ruling–appealed to the United States Supreme Court. The Supreme Court agreed to hear the case and held oral arguments on January 8, 1996. Eight days later, the justices disposed of the case with a one-sentence order: "The judgment of the United States Court of Appeals for the First Circuit is affirmed by an equally divided Court." Justice John Paul Stevens recused himself from the case for reasons he did not explain, and the remaining justices split 4-4. (We don't know which justices voted on which side.) This left the First Circuit's decision intact but did not set a nationwide precedent.

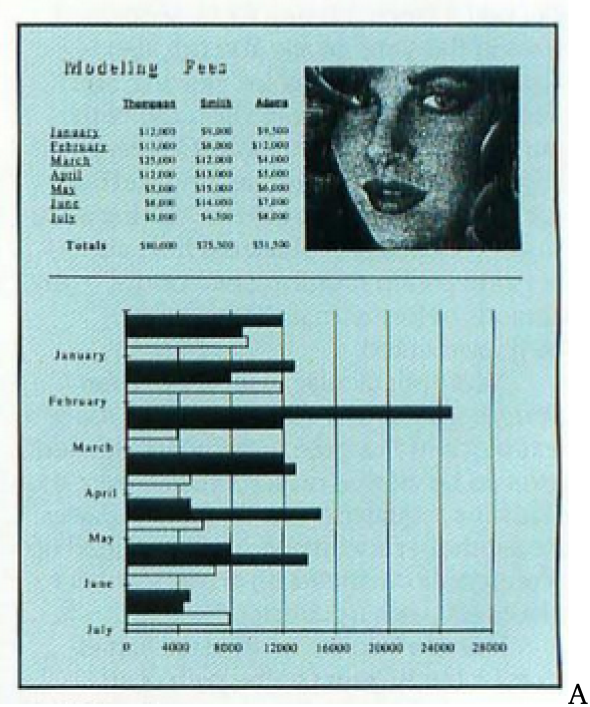
Notes from the Random Access File

- This episode is available from the Internet Archive and was originally broadcast in March 1987. As noted above, the Archive's recording is a rerun from October 1987.
- Larry Gross's post-Lotus career included a four-year stint in the 1990s as president of Knowledge Adventure, an educational software company that he started with his brother. CUC International acquired Knowledge Adventure in 1996 as part of a software company buying spree that included Davidson & Associates and Sierra Online. Gross stayed on with CUC until 1999 and served as president of Davidson & Associates. The Gross brothers then co-founded Idealab, a technology incubator, which led to the creation of CarsDirect.com, a startup they later sold for $640 million. Since the early 2000s, Larry Gross has continued to work in venture capital, serving as co-founder and managing partner of Structural Capital since 2003.
- Following the sale of Javelin in 1988, Robert Firmin continued to work in software development into the 2010s. But he's become more well-known in recent years for his work as a designer of historical public sculptures. He co-founded Daub & Firmin in 2006, now known as Artworks Foundry, which produces and restores bronze sculptures

and monuments.

- Sam Savage's General Optimization–now known as Lindo Systems Inc.–is still in business. The company continues to develop *What'sBest!*–now an add-in for *Excel*–with version 18 released in December 2022. Savage also serves as executive director of Probability Management, a nonprofit organization "dedicated to making uncertainty actionable through tools, standards, applications, and training."
- Eric Gaer had stints as CEO of a number of small tech companies between 1995 and 2012. He started a management consulting firm, Arroyo Development Corporation, in 1998, and in recent years has also moved into real estate sales.
- Gaer's former company, Daybreak Technologies, Inc., didn't have a long life on the market. Founded by Sheng A. Tsao and Lawrence V. Corsaro in 1984, Daybreak's initial product was the *Silk* spreadsheet. It never gained much traction in the market, especially after Borland's *Quattro* copied *Silk*'s recovery function. Daybreak tried to market a standalone program called *Cocoon* that extended this keystroke logging ability to other PC applications, including *1-2-3*. But it appears the company ran out of money in mid-1988 and filed for bankruptcy.
- Lotus Development's advertising for *HAL* credited Steve Klein and Dave Rolfe of Singular Solutions Engineering as the original developers of the program. I assume that Singular acted as a subcontractor for the Gross brothers and GNP Development. But I can't be certain as to the exact relationship.

Stewart Cheifet and Gary Kildall on the set of "Computer Chronicles." On the desk between them is a Macintosh II with a color monitor.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A

demonstration of “Trapeze” taken from MacWorld magazine. The top part of the screen is divided into two sections, with a spreadsheet table on the left and a digitized photograph of a woman’s face on the right. The bottom part of the screen displays a multi-level bar graph

Chapter 11: Microsoft Excel, Trapeze, Words and Figures, and Predict!

On May 2, 1985, Bill Gates and Steve Jobs held a joint press conference at Tavern on the Green, the famous restaurant in New York City’s Central Park. The co-founders of Microsoft and Apple, respectively, announced the forthcoming release of *Excel*, Microsoft’s newest spreadsheet program for Apple’s Macintosh. This wasn’t Microsoft’s first spreadsheet. Three years earlier, in 1982, Microsoft released *Multiplan*. But it had failed to gain market share against the dominant *Lotus 1-2-3*. So Gates decided to cede the traditional spreadsheet market to Lotus and refocus Microsoft’s efforts on the Macintosh’s graphical user interface.

Meanwhile, Lotus tried to make a big splash on the Macintosh with *Jazz*, which it had announced a couple of months earlier at the first MacWorld Expo in San Francisco. *Jazz* was not a port of *1-2-3* but rather an entirely new product offering an integrated suite of spreadsheet, word processing, database, and communications applications. While *Excel* had its own advanced features, Microsoft was careful to describe it as a “multifunctional” spreadsheet rather than an integrated office suite. Even Jobs, likely burned by the failure of the Apple Lisa’s “integrated software” approach, was content to proclaim *Excel* as the “world’s best spreadsheet” at the press conference.

Not everyone was reassured by Jobs’ assurance. *San Francisco Examiner* tech columnist John C. Dvorak noted that Microsoft had kept a tight lid of secrecy on the development of *Excel*–going so far as to strong-arm computer magazine editors into not discussing any details of the product prior to the May 2 press conference. Dvorak said his own columns were censored in various publications (though not the *Examiner*) to remove any references to *Excel*.

Dvorak suggested one reason for Microsoft's secrecy was that there was a chance *Excel* wouldn't launch on schedule–just like another long-promised product called *Windows*. Dvorak turned out to be wrong on that score. Microsoft started shipping *Excel* in October 1985, which was within the margin of error for the four-month release window Gates promised back in May.

Indeed, *Excel* quickly became a commercial success, easily outselling *Jazz*. It was also a critical darling. For example, Neil Shapiro wrote in his review for the October 1985 issue of *MacUser* that while *Excel* certainly had a learning curve it was more than worth the effort:

> Power users take note: The Macintosh is now the best choice available for spreadsheet sharpshooters. Microsoft's new *Excel* takes the price for the most powerful spreadsheet around and offers capabilities hardly ever dreamed of before, including a fully-integrated and full featured charting package as well as many database functions. *Excel* is the Uzi submachine gun of the business world…

By early 1987, Microsoft was prepared to take *Excel* to the company's native MS-DOS platform. But there were still some challengers looking to break into the Macintosh spreadsheet market, as we'll see in this next *Computer Chronicles* episode from April 1987.

Was the Mac Now a Viable Option for Business?

This was the third in a four-part series on business applications and the second to focus on spreadsheet software. Stewart Cheifet noted that in the prior episode they discussed MS-DOS spreadsheet software, as that was what most businesses used. But on the set was a new Macintosh II with a color monitor (see below), and this machine looked and acted a lot more like a business computer. Did co-host Gary Kildall think that the Mac would now be a serious player for people who used spreadsheets?

Kildall said that when the Mac was first introduced in 1984, it really wasn't targeted at the business market. In those days, the typical business applications were a spreadsheet, word processor, database, and so forth. But the original Macintosh was really a graphics engine with a small, slow disk. But now the two worlds of business and the Macintosh had started to come together with applications like desktop publishing, image processing, and creating rich text. The Macintosh II had a large-size screen (13 inches), a hard disk, and a local area network that could hook up to IBM machines. So the Mac could now be considered a good choice for business.

The "Look and Feel" Wars Have Begun

Wendy Woods presented her only report for this week, which focused on Lotus Development's recent lawsuits asserting copyright over the "look and feel" of its *Lotus 1-2-3* spreadsheet. (I actually covered the outcome of these lawsuits in the previous post when discussing one of the defendants, Adam Osborne's Paperback Software International.)

Woods provided narration over some footage of three seemingly identical computer spreadsheet screens. The fact they looked similar was part of the reason for the sudden increase in lawsuits between software developers. Lotus was suing Paperback Software International (PSI) over the similarity of its *VP-Planner* program and Mosaic Software for its *Twin* spreadsheet.

Tim Hale, an intellectual property attorney with Nelson & Russo, told Woods that the heart of Lotus' legal complaint was that Mosaic and PSI both infringed the overall "look and feel" of *Lotus 1-2-3*. Specifically, Lotus claimed the defendants used similar command names, menu structure, and syntax, such that the user who looked at one program versus the other would say the overall look-and-feel was the same.

Woods noted that while a program's source code was clearly protected by law, the elusive "look and feel" of a screen display was a relatively new aspect of software protection–and opened to sharp disagreement. Richard Bezjian, the president of Mosaic Software, told Woods that you could not copyright or patent the "functionality" of a computer program. He insisted that most of the words in the user interface should be available to other programs, especially common words.

Hale explained that if you took a simple book, the words contained in that book were all common English-language words. They were not "original" in that sense. What became original was the manner in which the developer put them together, the way that they organized or sequenced them. That was what copyright law protected.

Woods said that a recent case involving communication software could have a significant impact on future "look and feel" cases. Digital Communications Associates (DCA), which owned the software *Crosstalk*, sued Softklone Distributing Company, for its its *Mirror* communications package. The court ruled in favor of DCA. Hale said that the judge found that essentially one screen was enough to constitute copyrightable material, and the defendants infringed that key screen, which meant that cloning user interfaces would be extremely suspect in the future.

One of the many difficulties encountered by software developers, Woods said, was the overwhelming dominance of a handful of programs, which some companies viewed as *de facto* standards. Mosaic's Bezjian said when you go into a market like spreadsheets, you realized that there was primarily one company dominating the market, and that was Lotus, which had between 60 and 80 percent market share. So Lotus' *de facto* standards made it literally impossible for anybody to enter the market or do anything constructive.

Woods said that all sides agreed–for different reasons–that the outcome of these cases would have a major impact on the future of original software. Bezjian said that if Lotus won, it would be chaos. People would start doing things just for the sake of being different, and it would be incredibly hard for users to do anything with these programs. Attorney Hale, however, said that one of the purposes of the copyright laws was to reward people's invention. He wasn't sure that "cloning" someone else's software was that creative.

Spreadsheets…Now in Living Color!

Mike Slade and Andrew Wulf joined Cheifet and Kildall for the first studio round table. Slade was the Macintosh product manager for Microsoft *Excel*. Wulf was president of Data Tailor, Inc., which developed the Macintosh spreadsheet program *Trapeze*.

Kildall opened by noting that the "granddaddy" of computer spreadsheets, *VisiCalc*, was a character-oriented program. There was then a major generational change when *Lotus 1-2-3* came out with graphics. Did Slade think the Macintosh II represented another generational change when it came to spreadsheets? Slade said the Macintosh in general helped that change to occur. The whole notion of a graphical user interface with pull-down menus, a mouse, and icons led Microsoft to design *Excel*, a spreadsheet that was more like working with pieces of paper on a desktop and letting you make relations between those pieces of paper. The Macintosh II just extended that in many ways, including color graphics and enhanced speed.

Kildall asked Wulf for his thoughts. Wulf saw the Mac II as allowing people to do things they hadn't been able to do before, such as working with larger spreadsheets, calculating more complex models, and displaying more charts. That would improve a lot of people's productivity.

Turning back to Slade, Kildall asked for a demonstration of *Excel*. Slade opened up a sample file and noted that *Excel* didn't look much like a traditional spreadsheet. There were not one, but several different worksheets opened, which looked like different pieces of paper on your desk. You could zoom the screen up and work with one or several sheets at a time, build formulas by pointing and clicking, and stroll around the worksheet just by using a mouse. (For context, we're talking about an old-school Apple mouse with one button and no wheel.)

Slade continued that it was very easy to build relationships between worksheets just by pointing and clicking. He demonstrated how you could take two subsidiary worksheets and paste their names into a "total" spreadsheet, which created links between the three worksheets. So if later, one of the values changed on one worksheet, that was instantly reflected on the linked spreadsheet. Slade said you couldn't do that in *Lotus 1-2-3*, since it could only display one spreadsheet at a time.

In the same way, Slade said, it was easy to take a group of numbers and quickly open a window that had a graphical representation of those numbers, which would then be linked. On his sample file, he selected a group of numbers and created a bar graph. He then showed how when you changed one number on the worksheet, it was immediately reflected in the graph. The Macintosh also had a built-in pictorial gallery that made it possible to pick between different kinds of charts. So you could easily redraw a given chart in a different format.

Slade continued that one of the nicest things about *Excel* was that it let you automate things using macros. *Excel* actually recorded what you did and played it back. Slade demonstrated this by running a macro he previously recorded that prompted him to enter data into a worksheet, and then automatically used that data to create a chart. Cheifet clarified that Slade didn't have to write the macro, it simply created one by recording what he did before. Slade said that was correct. You could write out the macro if you wanted to, but it was simple to have *Excel* do it for you.

Turning back to Wulf, Cheifet noted that his program, *Trapeze*, took advantage of the color available on the Macintosh II. What role did color actually play in spreadsheets? Did it matter at all? Wulf said color could help a person who was developing a spreadsheet to show their numbers in a way that was easier for other people to comprehend. For example, you could show different numbers in red to indicate you were losing money, or highlight labels with color so they were easy to find in a large worksheet. And of course, you could do charts in color, which made it much easier to display information graphically than you could with just black and white graphics.

Cheifet asked for a demonstration of *Trapeze*. Wulf opened three sample worksheets. He explained that the difference between *Trapeze* and a traditional spreadsheet was that instead of having rows and columns, it was a free-form type of spreadsheet. The basic unit was a block, which was a collection of numbers that could be a row, a column, a table, or even an individual value. Each block had a name, which could be used to build formulas. The blocks themselves could be moved around the spreadsheet and re-sized to change their shape without affecting the underlying formulas. The relationships between the blocks were totally independent of where the block was actually located. You could also build charts within the same spreadsheet page.

Wulf noted that because the Macintosh was so good at doing fonts, styles, and pictures, there was no reason why you couldn't include a picture within a worksheet. So you could have a data entry form with calculations on top mixed in with graphs and pictures (see below). *Trapeze* therefore allowed you to not only do calculations, but also lay them out in an attractive manner. A lot of people who did calculations needed to present them to people, so *Trapeze* enabled them to do so without having to use another program to put all of the pieces together.

Cheifet asked if *Trapeze* was written especially for the Mac II. Wulf said it ran on all Macintoshes. The version he demonstrated was shipped in January 1987 before Apple released the Mac II. But they were working on a new version specifically for the Mac II to take advantage of the additional colors and features.

Cheifet asked Slade if *Excel* required a Mac II. Slade said no. *Excel* was written almost two years ago and ran fine on the Mac II but also worked on the entire Macintosh family. Microsoft was also working on a new version for the Mac II, however, to take more specific advantage of its capabilities.

Adding Word Processing and Probability to Traditional Spreadsheets

Camilo Wilson and Richard Roth joined Cheifet and Kildall for the final segment. Wilson was president of Lifetree Software, which developed *Words and Figures*. Roth was director of Unison Technology, which developed *Predict!* (Yes, we have an exclamation point in a software title for the second week in a row!)

Kildall asked Wilson if he felt more people would move towards high-resolution, color graphics for spreadsheets, or would they stick with the traditional *Lotus 1-2-3* model? Wilson said there was no doubt that some people wanted to look into the "world of the future." But the fact was that *1-2-3* currently had an install base of around two million copies. And the last thing people wanted to do was re-learn what they already knew.

Turning to Roth, Kildall said that both he and Wilson offered products that improved upon the *1-2-3* model. What sort of things did Unison do with *Predict!*? Roth said *Predict!* took what everybody already knew in terms of the spreadsheet model and added the capability to express "uncertainty" in their forecasting so they could model various business situations.

Kildall then asked Wilson for a demonstration of his product, *Words and Figures*. Wilson said the product was based on the idea that people wanted a reasonably priced Lotus-compatible spreadsheet. *Words and Figures* provided this. On top of that, *Words and Figures* also included a word processor, which was the most commonly used function on personal computers.

Cheifet asked about the logic of bringing a word processor into a spreadsheet. Wilson said the logic was that if you had a financial story to tell, you might want to tell people a "verbal" story as well. Pulling up a sample document in *Words and Figures*, Wilson explained that it looked much like any other Lotus-style spreadsheet. But you also had access to a word processor by pressing a single key as opposed to loading a separate program. And he emphasized that the word processor felt "like a real word processor.” A lot of people used *1-2-3* to write notes, of course, but that was a “very unkind” way to do it.

Continuing his demo, Wilson showed how you could import the spreadsheet into the word processor. When doing so, you could still work with the spreadsheet inside of the word processor. So for example, you could change values within the spreadsheet and have the program perform the necessary recalculations. These changes were also reflected in the original spreadsheet. You could edit the spreadsheet within the word processor, and vice versa. The program could also split the screen horizontally into two windows, running the spreadsheet on the top half and the word processor on the bottom half.

Cheifet asked if the word processor component of *Words and Figures* was a “full-powered” program. Wilson said no, the word processor was designed specifically to be compatible with a spreadsheet. It was effectively a layer on top of the spreadsheet.

Returning to Roth, Cheifet asked for further clarification on “using uncertainty” in a spreadsheet with *Predict!*. Roth said when people talked about uncertain things, they made statements like, “My sales would be between two various numbers.” They weren’t dealing with absolute numbers like what you typically needed with a spreadsheet. And if you didn’t have the capability of representing uncertainty, then when you did present the results in a forecast, you were leaving out the majority of your data. *Predict* enabled you to encapsulate all of the possibilities for a particular variable on your spreadsheet–with all of the possibilities associated with that–and do calculations based on those probabilities.

Cheifet asked for a demonstration. Roth said the best way to show what he meant was to give a comparison between the way people use spreadsheets and the way they could use *Predict!* in a similar situation. He pulled up a simple spreadsheet that looked at sales, costs, and profits. So if you entered $1,000 in sales and $500 in costs, the spreadsheet calculated you had $500 in profits. If you wanted to do a “what if?” with different possible sales figures, you would have to go back and enter each change manually in different cells.

But with *Predict!*, Roth continued, you could represent all the values for a particular variable–in this case, sales–in a single cell. You did that by creating a *distribution*. There were eight pre-defined distributions in *Predict!*, and a ninth that the user could define. For this demonstration, Roth asked for a *triangular distribution*, which looked at a possible range of sales between $500 and $1,000, with the most likely figure being $700. He instructed *Predict!* to maintain a list of 100 “what ifs?” within this range. (The software could track up to 8,000.) He then did the same thing for costs, entering a uniform distribution of between $300 and $700 without a middle point.

Roth then had *Predict!* run those 100 “what if?” scenarios automatically. You could then view the results as a graph, which plotted the 100 “profit” projections along a probability curve. Cheifet asked if you could calculate the odds of a loss. Roth said you could. In this sample, those odds were 8 percent.

Cheifet asked about the consequences of the new IBM PS/2 platform on software development. Roth said people using a program like *Predict!* needed a machine that could perform a lot more computations and store more data. So a machine like the PS/2 would be a boon to their product.

Kildall asked if graphical interfaces would become standard in these sorts of applications. Roth said he didn’t know. People were used to the traditional spreadsheet format. Whether they wanted something else to get the job done, only time would tell.

Supercomputer Makers Continued to One-Up Each Other

Susan Chase presented this week’s “Random Access,” which was recorded in April 1987.

- Lotus Development Corporation signed a 10-year agreement with IBM to design software for its largest computers, starting with a version of *1-2-3* for the System/370 mainframes scheduled for release in 1988. The deal put Lotus on a more even footing with Microsoft,

which recently overtook Lotus as the world's largest manufacturer of PC software. Chase noted this meant that Ashton-Tate was now the only one of the "Big Three" software makers without an IBM relationship.
- Lotus also announced two other versions of *1-2-3* with "multidimensional" support capability, a line of multi-user database programs, and an enhanced programming capability for *1-2-3*.
- ETA Systems unveiled the ETA-10, a supercomputer capable of processing 10 billion calculations per second. ETA, a subsidiary of Control Data Corporation, claimed this new machine had twice the performance of Cray Research's supercomputers. Chase said that Cray, however, claimed its Cray-2 was three times faster than the ETA-10.
- Thinking Machines Corporation announced its own supercomputer that it claimed was faster than both the ETA-10 and Cray-2 when performing certain tasks.
- Apple announced plans to create an independent software company to distribute programs made by small developers. Chase said the new company would sell programs written by other companies that did not otherwise have the resources to market and distribute their products. The new company would also sell Apple-developed programs under its own label.
- Paul Schindler reviewed "MORE" (Living Videotext, $295), a graphical outlining and database program for the Macintosh.

"Trapeze" Was Ahead of Its Time

Trapeze was perhaps the most forward-looking program demonstrated in this episode. Andrew Wulf later wrote on his personal blog that *Trapeze* was in many ways a spiritual ancestor to *Numbers*, the spreadsheet that Apple first released for the Mac in 2007:

> Like *Numbers*, *Trapeze* featured smart tables (which we called blocks), charts (2D and 3D), graphics and text, all freely movable around a canvas (which we called a sheet). Blocks were

> related by name (either the whole block, or tables where each column had a subname). Smart resizing occurred when you change related block sizes (i.e. add rows to a block and all dependent blocks resized and shifted location if necessary).

Wulf started programming in 1981 when he joined the defense contractor General Dynamics in Texas. Wulf, a chemist by training, spent the next three years learning to program on a variety of systems, including the Apple Lisa. When the Macintosh launched in 1984, he quit his job and decided to develop software for the new platform.

At first, Wulf didn't have an actual product in mind. He started out developing templates for existing spreadsheets like *Multiplan*, Microsoft's predecessor to *Excel*. But he quickly became frustrated with the limits of the software and started thinking about making his own spreadsheet.

At the time, Wulf was sharing an office suite with a person he described as an "older guy" who ran a consulting company. This person–whom I believe was Bill Towler–convinced Wulf to turn his idea into a product. The pair incorporated Data Tailor, Inc., in Fort Worth, Texas, with Towler as chairman and CEO and Wulf as president. Wulf then hired two other programmers, Bob Murphy and Ken Clark, to help him develop *Trapeze*.

The development took up most of 1986. That November, *MacWorld* ran what appears to be the first press mention of the product. But the formal launch took place at the January 1987 MacWorld Expo in San Francisco.

In March 1987, Towler told the *Fort Worth Star-Telegram* that Data Tailor's first-year sales target for *Trapeze* was 21,000 units at a retail price of $295. To put that in context, Apple projected Macintosh sales of between 500,000 and 600,000 units in 1987. The *Telegram* calculated that meant Data Tailor only needed to capture about 1-in-12 of those buyers to meet its projections.

Indeed, Towler's stated goal was to be the number-two spreadsheet on the Macintosh after *Excel*. But when all was said and done, Wulf said that only about 13,000 copies of *Trapeze* sold during its life cycle–or roughly 60 percent of Towler's first-year projection. Wulf largely credited the underwhelming consumer response to what he described as a negative review from *MacUser* written by a "guy who had a bad day" and took it out on his product.

The review in question was by Robert R. Wiggins and appeared in the June 1987 issue of *MacUser*. I wouldn't characterize the review as a "hatchet job," but Wiggins was clearly frustrated by *Trapeze*'s non-traditional approach to creating spreadsheets and what he perceived as its shortcomings compared to *Excel*:

> To begin with, [*Trapeze* is] not easy to learn and use right away. It takes some time to become accustomed to all the different cursors and pop-up menus and/or learn the key equivalents. This is one Macintosh program where reading the manual is definitely in order. And while the manual has an excellent tutorial and good descriptions of the built-in functions, it is not always that useful as a reference.
>
> If you are a heavy spreadsheet user, *Trapeze* takes a lot of getting used to, and just plain doesn't do some things that other spreadsheets do. There is no macro capability, for example, so although the built-in function list is impressive, you cannot add your own. Linking worksheets requires that they all be open (opening a single worksheet of a lined set with generate a lot of NAs–it doesn't store the most recent value the way *Excel* does). Formulas work on blocks, so if you have worksheets with formulas going across and down at the same time, you either have to use single cell blocks or use complicated extraction functions (`XBLOCK(1,2,1,1,Revenue)` is not exactly intuitive). The charting capability of *Trapeze*

> doesn't offer the kind of flexibility that *Excel* does, although for simple charts you might find it adequate.

MacWorld offered a much more favorable review in its May 1987 issue, with Prasad Kaipa and Edwin Haskell writing that *Trapeze* actually "fills some of the gaps left by power spreadsheets such as *Microsoft Excel*," while agreeing with Wiggins that the software "may be more difficult to learn than other spreadsheets." That said, Kaipa and Haskell recommended the program, noting that "once you set up and organize your data, it is much easier to work with *Trapeze* than *Excel*, and it is useful to have all the information about a project in a single file."

Wulf himself conceded that the biggest barrier for many customers was the inability to import spreadsheets from either *Lotus 1-2-3* or *Excel*. And while *Trapeze* did develop a small, loyal following, it wasn't enough to keep Data Tailor afloat as an independent software publisher. In July 1987, the company shipped a revised version of *Trapeze* that attempted to address some of the criticism. Towler also tried to re-brand the program as an "integrated presentation worksheet" rather than a spreadsheet. He also hiked the price $100 to $395.

But just a few months later, in January 1988, Data Tailor sold the rights to *Trapeze* to Boston-based Access Technology, Inc., for around $2 million. Access was best known at the time for developing *20/20*, a spreadsheet for UNIX-based systems. Data Tailor effectively went out of business at this point. Wulf and his programming team had already left the company and created their own software consulting firm, SU5, Inc., which continued to update *Trapeze* for Access Technology.

Later that year, in August 1988, H&R Block acquired Access Technology in a $36.75 million stock swap. Around the same time, H&R Block also purchased MindWork Software, which published the *MindWrite* word processor for the Macintosh. *MindWrite* and *Trapeze* were then consolidated within a new Access Technology unit under CompuServe, which was also an H&R Block subsidiary.

Trapeze didn't fare much better under this new arrangement. By April 1989, Access Technology discontinued retail sales of both *Trapeze* and *MindWrite* and only offered them by mail order. So *Trapeze*, which initially sold for $295 at its 1987 launch, was available for just $59.95 just two years later.

Ray Kingman, Access Technology's marketing director, soon bought out the company's Macintosh software division, which he reorganized as DeltaPoint. While *Trapeze* finally died under DeltaPoint's watch, Kingman contracted with Wulf's SU5 to create a new graphics presentation program, *DeltaGraph*, which proved far more successful. So much so that later versions of *DeltaGraph* remained on the market until at least 2015. (Wulf's company stopped developing DeltaGraph in the mid-1990s.) Wulf himself retired a few years ago from programming to focus on his work as a digital artist.

Notes from the Random Access File

- This episode is available at the Internet Archive and was first broadcast around April 7, 1987.
- Like Adam Osborne's Paperback Software, Richrd Bezjian's Mosaic Software also contested the Lotus Development "look and feel" lawsuit. The two cases were initially supposed to be tried together, but Mosaic's attorney dropped out on the second day of the 1990 trial due to illness. Mosaic then agreed to abide by the judge's decision in the Paperback case. As I explained in my last post, the judge ruled in favor of Lotus, and both Paperback and Mosaic were forced to withdraw their products from the market as part of an overall settlement. In 1995, however, a federal appeals court rejected the "look and feel" argument in a separate lawsuit that Lotus brought against Borland International. Unfortunately, Mosaic Software was already defunct, having closed its doors sometime around 1994.
- Following the demise of Mosaic Software, Richard Bezjian started a new company, Boomerang Software, where he served as CEO from 1997 to 2008. Since 2008 he has been president and CEO of Energize Global Services, a financial

technology company.

- Tim Hale is still a practicing attorney in California.
- Mike Slade joined Microsoft in 1983 and stayed until 1990, when he moved over to Steve Jobs' NeXT Computer. Slade then served as CEO of Starwave, an early internet company created by Microsoft co-founder Paul Allen, from 1993 to 1998, when the business was sold to Walt Disney. Slade later reunited with Jobs at Apple, serving as a strategic advisor until 2004. And of course, Slade has been active in venture capital since the early 2000s.
- Camilo Wilson purchased one of the first IBM PCs released at retail in California in June 1981. Dissatisfied with the early word processors available for the system, he developed his own, which became known as *Volkswriter*. Wilson borrowed $15,000 to start Lifetree Software, which marketed *Volkswriter*. By 1984, the company had sold 40,000 copies of *Volkswriter* and employed 27 people. Other programs like *Words and Figures* and *Correct Grammar* followed. Wilson eventually sold Lifetree to WordStar International in February 1991 and joined the company as vice president of its new Writing Tools Group. WordStar itself ceased to exist after a 1994 merger into SoftKey International. Wilson went on to start an internet services company, Cogix, which is still active today.
- I couldn't find much information on Richard Roth and *Predict!* A London-based venture capital firm, Oil Partnerships, initially contracted Roth to write *Predict!* around 1984. According to *PC Week*, Oil Partnerships wanted software to replace *Lotus 1-2-3* that could perform Monte Carlo Simulations, which is essentially what Roth was describing in his *Chronicles* demo. Roth later worked for Unison Technology, a U.S. subsidiary of another British company, which released *Predict!* as a commercial product in January 1987. I don't know what became of Roth or the product after that.
- Apple's new software company was called Claris Corporation. Claris later became best known for its FileMaker database product, which it purchased from the original developer in July 1988. FileMaker became so successful that Claris eventually discontinued its other

products and spun-off from Apple in 1988 as FileMaker, Inc. FileMaker revived the Claris name in 2019 and continues in business today as Claris International Inc.
- That 10-year deal between IBM and Lotus would technically never be completed, as IBM acquired Lotus outright in 1995.
- Apple released the Macintosh II on May 1, 1987. This episode of *Chronicles* was taped a few weeks beforehand. Andrew Wulf later wrote that he obtained a pre-production version of the Mac II's 13-inch color monitor for use on the broadcast. That means this episode was quite possibly the first on-air demonstration of a color Mac.

Chapter 12: Double Helix, PFS Professional Write, and R:BASE

Database managers often tested the limits of 1980s personal computers. For example, longtime *Computer Chronicles* contributor George Morrow faced an ongoing problem with the database he maintained to catalog his massive collection of 78 records. He told the final issue of the *Morrow Owners' Review* that he'd been forced to abandon his own Morrow Designs MD11 because the old CP/M machine could no longer hold the database.

Morrow initially used a database manager called *Personal Pearl*, but after about 9,000 records or so, it "got severe hiccups." So he moved to Ashton-Tate's *dbase II*. But after he reached record 32,678 on that program, it "wrapped around on itself and destroyed records." (This would be the *dBASE* equivalent of the *Pac-Man* level 256 kill screen.) Thankfully, Morrow managed to move the database to an MS-DOS machine and repair his data thanks to *Norton Utilities*, something he discussed in a previous *Chronicles* episode.

As for this next *Chronicles* episode from May 1987, the focus was on the successor to *dBASE II*–*dBASE III*–and several of its competitors in the MS-DOS and Macintosh database market. The episode's cold open featured, appropriately enough, Stewart Cheifet visiting George Morrow at his home. Cheifet posed the question, "What do you do when somebody says to you, 'What do you have by Hoagy Carmichael from the year 1930?'" Either you needed another room full of 4-by-5 index cards and a week of time, or you used a personal computer with a database manager to get the answer in seconds. (Morrow worked in the background and quickly produced the answer to Cheifet's question, which was “six.”)

Back in the studio, Cheifet showed Gary Kildall several “primitive” forms of database management, including a Rolodex, an address book, filing folders, and an accordion-style file box. But these all had disadvantages. They took up a lot of room, were hard to update, and could only be sorted alphabetically. That’s why many people had now moved to computer database management.

Cheifet noted there were two basic versions of database managers: relational and flat-file. He asked Kildall to explain the difference. Kildall said a flat-file manager basically took a sequence of records, such as names or addresses, and sorted them to make something like a mailing list. That was a very simple operation. In contrast, relational databases were based on a more complete mathematical theory. Every piece of information was considered a table. Each line of the table was called an *n-tuple*. In mathematics, that was called a *relation* and hence the name *relational system*. For example, a Rolodex could be considered a table. You might then have another table listing geographic sales areas. With a relational database, you could extract the names from the Rolodex and put it together with the sales area table to get a new table. You could then keep adding tables to develop a more comprehensive mailing list.

Accounting Firms Turned to Macintosh Database Solution

Wendy Woods presented her first remote segment, which focused on the use of Macintosh-based database management software at the San Francisco office of accounting firm Peat Marwick. Woods said that behind every successful office-bound PC was a software program that either sped up or replaced tasks formerly done by hand. Peat Marwick found a way to do both and create a new communications link at the same time. The firm’s graphic arts department replaced billing sheets with an all-Macintosh network, combining Odesta Corporation’s multi-user *Helix* database with *MacDraw* and a LaserWriter printer to order, bill, and create graphic presentations in as little as 24 hours.

The *Helix* database, running over an AppleTalk network, operated like an electronic assembly line, with the additional feature of moving in any direction or speed required. As work orders were received, Woods explained, they were entered into the database by client account, date of entry, and subject description. The client's rough sketch was digitally reproduced and stored on disk for later printing. The file moved through different stages, accumulating charges automatically according to the time spent on each task. The network permitted each authorized user to verify the completion of each step before the final printout.

Looking at Flat-File Databases

Dennis Travins and Jim Hubbard joined Cheifet and Kildall in the studio. Travins was a video production manager with the Stanford Instructional Television Network (SITN), where he worked with Software Publishing Corporation's *PFS Professional File*. Hubbard was a Real Estate broker who used Symantec's *Q&A*.

Kildall noted their guests were users of database systems rather than software developers or marketers. How exactly did they use database management in their particular line of work? Travins said that at SITN, they broadcast live computer science and engineering courses out to Silicon Valley directly from studio classrooms on campus. His job was to manage six different studios throughout the day, keeping track of all of the production staff and professors. He used a database to accomplish this and manage the necessary accounting.

For his part, Hubbard said he used a database to keep track of the property owners that he worked with. He had an area of 500 to 600 people and entered their information–names, addresses, telephone numbers, et al.–into the database. He also used the database to do mailings.

Cheifet asked Travins to demonstrate *PFS Professional File* and explain why he used that program. On an in-studio computer, Travins showed what he called an “outline of a database” that he used to keep track of all of his people and studios. For instance, the database tracked the time-sheets for each student who worked at SITN. A student could enter their information offline. Travins then totaled them up using the database. Another feature of *PFS* allowed him to create reports. Using a pre-developed macro, he pulled up a cross-tab report that showed the cost of putting on a specific production at SITN.

Kildall asked Travins how many records he kept in the database at one time. Travins said he’d had as many as 365 active records at once. Stanford ran on a quarter system, so there were about 300 to 400 records per quarter. He added that one reason he liked *PFS Professional File* was its integration with other *PFS* software. This enabled him to dump information from *Professional File* into the matching *PFS* spreadsheet.

Turning to Hubbard, Cheifet asked him why he used Symantec’s *Q&A* in his real estate brokerage. Hubbard said *Q&A* was a very powerful database manager. He kept information on between 2,000 and 3,000 properties in his database. This included data about each property–lot size, number of bedrooms, et al.–as well as contact information for the owners. *Q&A* allowed Hubbard to access the database, gather information, and do a mailing.

Kildall noted that Symantec advertised *Q&A* as having an “artificial intelligence” component–i.e., it was able to parse natural language. Kildall asked Hubbard for a demonstration of that feature. Hubbard pulled up some forms he used for a prior mailing in *Q&A*. He entered: `SHOW US THE FORMS MAILED ON 4/2/87`. The program prompted him to explain what he meant by `FORMS`. Was that word part of the built-in dictionary or was there some other information required? The software also didn’t understand the word `MAILED`. Hubbard said there was likely confusion because the field used in the actual database was `DATE MAILED`. So if he changed his inquiry to say `DATE MAILED` it would probably work. (Basically, the “natural language” sentence had to use words defined in the database.)

So Hubbard entered a new inquiry: `SHOW US THE FORMS`

`DATE MAILED ON 4/2/87`. Once again, the program got stuck on the meaning of `FORMS`. Cheifet quipped that the software didn't actually learn anything from the previous query. But after Hubbard re-explained the term, *Q&A* managed to produce a report showing the street number and street name for all forms where the date mailed was April 2, 1987.

Notwithstanding this particular demo, Cheifet asked Hubbard if he was pleased with how *Q&A* worked in his real estate practice. Hubbard said he was. He noted that *Q&A* came with a nice word processor. And of course, the "artificial intelligence" was nice to run particular reports. He ran another demonstration–`RUN THE MAILING REPORT`–which went off without a hitch. This produced a report that showed all of the properties that he'd mailed to with the date of each mailing.

Optometrist Eyed Own Database Solution

Wendy Woods returned for her second and final remote segment, this time featuring a San Bruno, California, optometrist, Dr. Gordon L. Epstein, who developed his own custom database manager to run his practice. Woods explained that Epstein had tried, but wasn't satisfied with, any of the software designed specifically for optometry. So he put together his own, called *Eye-Base*.

This was actually a customized interface built on top of Ashton-Tate's *dBASE*, Woods said. Epstein used *Eye-Base* to track inventory, patient accounts, and appointment scheduling, among other things. Epstein told Woods that the computer was a means in which he could make the rules. And if they don't obey those rules, he could make changes. Indeed, Epstein had added other programs to his custom system, including Paperback Software's *VP-Info*. This was a graph program that allowed him to compare the time it took to receive supplies from different vendors and determine which activities generated the most revenue.

Woods said that as with many businesses, optometrists were at a crossroads. Caught between changing technology and the limits of various software packages, there was a great deal of confusion. That was why Epstein and thousands of others had to become as good in computers as in their own professions.

Looking at Relational Databases

Thom Kozik and Lynn Luukinen joined Cheifet and Kildall for the final studio segment. Kozik was the applications director with Ashton-Tate, the developer of *dBASE III Plus*. Luukinen was director of advanced products with Microrim, which developed and published *R:BASE*.

Kildall opened by noting the products demonstrated in the previous studio segment, *PFS Professional File* and *Q&A*, were both flat-file database managers. How did a relational database like *dBASE* differ? Kozik said a relational system took advantage of the fact that a lot of data was often kept in different departments or disparate sets of information. So you could relate information from one file to another, such as connecting invoices to orders. There was a common number generally kept between both pieces of information that made them related.

Cheifet asked Kozik for a demonstration of *dBASE III Plus*. Kozik showed off the menu-driven assistant that came with the new version. This assistant let users program settings for commonly used files and tasks into a “view file” type that could then be accessed directly from the menu. The user could thus restore their settings with a single command.

Continuing the demo, Kozik said if you knew the piece of information you wanted to look for–say a specific customer number–you could enter it directly into a search field. The software then positioned you at the appropriate record. A status line at the bottom of the screen informed you of your current location within the database. (*dBASE* didn’t actually display the record at this point, it only informed you that it had located the record.) Kozik then selected the `EDIT` function to look at the record inside a pre-created screen. You could use the assistant to create additional screens for the same database.

Kozik added that *dBASE* was designed to handle millions of records at a time. It was obviously hard to work with that many pieces of information. So you could filter down information by creating a query. Using an “advanced query system,” you could create a custom search. For this demo, Kozik created a query to look for records that used the word “group.” This allowed you to work with a smaller set of data. *dBASE* also kept a record of previous commands entered in a history buffer, which could be saved to a different file.

Cheifet turned to Luukinen and asked about her company’s product, *R:BASE*, which was also a relational database manager. How did it differ from *dBASE*? Luukinen said the primary difference was that *R:BASE* provided additional tools with the database to allow the users to automate functions. For example, there was a tool to automate applications. There was also a tool to create complex forms or reports without the need for programming.

Cheifet next asked about the improvements in the most recent release of *R:BASE*, known as System V, over the original product. Luukinen said there had been lots of different changes. The aforementioned automation tools were probably the biggest change. There was also now multi-user capability and new built-in financial functions.

Luukinen then provided a demo of *R:BASE*. Specifically, she demonstrated the application creation feature. She showed how you could modify a previously created application designed to create reports. Essentially, this allowed you to create and write an entire macro program without having to learn the underlying programming language or write code. The new application was then available from the main menu screen.

Kildall pointed out that IBM recently announced a long-term plan to create its own relational database system based on the SQL standard. What effect would that have on the guests’ companies? Kozik said that Ashton-Tate planned to continue down its own path of developing for the 8088- and 8086-based machines while also working with the newer 80286 and 80386 platforms. Luukinen said that IBM planned to integrate its database into the operating system, and that the tools developed to create databases within *R:BASE* could possibly be adopted for IBM's structure as well.

IBM Slashed XT Prices to Clone Levels as New PS/2 Hit Shelves

Stewart Cheifet presented this week's "Random Access," which was recorded in May 1987.

- Toshiba announced that in light of the Reagan administration's tariffs on Japanese laptops, it would no longer export its T3100 and T1100 models into the United States. Cheifet said the new 100-percent tariffs had effectively priced the Japanese laptops out of the market. (I discussed the this story in a prior post.)
- Data General released a new 12-pound laptop, the DG12T, with a supertwist LCD, a backlight that could be turned on or off, a 10 MB hard drive, dual-speed CPU, and one floppy disk drive.
- With the introduction of the IBM PS/2, Big Blue slashed prices on the PC-XT, which was now available with a monochrome monitor for under $1,000.
- A Dallas-based research firm, Future Computing, gave good grades to the new PS/2 and said it was now a matter of when–not whether–IBM would re-establish its lead in the personal computer field. (Uh…)
- Phoenix Technologies, which famously cloned the original IBM PC BIOS, said it may have a clone of the PS/2 BIOS ready within six months. Meanwhile, two other potential clone-makers reportedly had PS/2 machines disassembled and under analysis on the day of the machine's release.
- Plus Development, makers of the Hardcard, announced a new 40 MB version of its hard drive on a board, which retailed for $1,199. (Wendy Woods profiled the original Hardcard in an earlier episode.)
- Paul Schindler reviewed *HFS Backup* (Personal Computer Peripherals Corporation, $50), a hard disk backup tool for the Apple Macintosh. Schindler praised the program's

flexibility and access to information that the Macintosh itself didn't provide.
- Aldus Corporation planned to go public with a $32 million initial stock offering.
- Gary Kildall's Digital Research announced its new *GEM Desktop Publisher*, which would run on any PC with 512 KB of memory and the new IBM PS/2.
- Student hackers accessed Alabama school's computer system and printed out blank report card forms that they then sold to their fellow students. Cheifet said the hackers were identified and expelled.
- Meanwhile, German hackers cracked the code of the country's 160,000 poker machines and sold information about the underlying algorithm to gamblers. Cheifet said programmers were now "hustling" to reprogram the compromised machines.
- A survey by computer game publisher Epyx found that 40 percent of business executives used their office PC to play games an average of 15 minutes per day.

Niche Databases Endure Into 2023

In the previous posts on this business applications miniseries, I discussed how the markets for word processors and spreadsheets followed a similar pattern. An early market leader from the pre-IBM PC days was replaced by another dominant application in the MS-DOS period that was itself replaced by Microsoft once Windows became widely accepted. Database management software, however, proved a bit different.

While Microsoft *Access* certainly gained prominence once we get into the 1990s, database software as a whole retained a lot more of the smaller niche applications. Indeed, two of the programs featured in this episode, *R:BASE* and *Helix*, are still in active development today, 36 years after the original airdate. Two others, *dBASE III* and *Q&A* are long gone, as I've discussed in earlier posts.

A Brief Overview of Software Publishing

Corporation

A third, *PFS Professional File*, is also no longer with us. The developer, Software Publishing Corporation (SPC), has been mentioned several times on *Chronicles* up to this point, with Paul Schindler reviewing a few of their products. Fred Gibbons, Janelle Bedke, and Job Page founded SPC in 1980. The trio previously worked at Hewlett-Packard. Page recalled that one day in 1979, he ran into Gibbons in the hallway at HP. Gibbons worked in marketing, while Page worked on database managers for minicomputers.

Gibbons brought up *VisiCalc*, the spreadsheet program recently released on the Apple II. It led him to believe there was now a potential market for standalone microcomputer software. He gave Page an Apple II to play around with. Page eventually developed a database manager called *Personal Filing System*, later abbreviated *pfs*, which became the brand name for a host of SPC releases in the business applications market. This included *Professional File*, which was meant to compete with Ashton-Tate's *dBASE*, then the market leader.

As I mentioned in a recent post, SPC acquired Wisconsin-based Office Solutions, the publisher of the word processor *OfficeWriter*, in 1988. Office Solutions then effectively became SPC's customer support center. SPC itself undertook a major downsizing in 1991. Gibbons decided to sell the entire *pfs* line to Spinnaker Software. This was part of a shift away from consumer software to products focused on the business market, notably the graphics presentation program *Harvard Graphics*, which SPC first released in 1986.

Unfortunately, sales of the DOS-based *Harvard Graphics* started to plummet as Windows 95 approached. Gibbons resigned as CEO in 1994. Two years later, in October 1996, Allegro New Media acquired SPC in an all-stock transaction. I'm not exactly sure of the fate of *Professional Writer*. It likely went to Spinnaker as part of the 1991 sale, and Spinnaker in turn was absorbed into The Learning Company in 1994.

R:BASE Quietly Chugging Along Under Longtime Developer

We also have the usual bit of corporate ownership shenanigans with our two surviving products, *R:BASE* and *Helix*. Wayne J. Erickson founded Microrim, the original developer of *R:BASE*, in 1981, together with his brother, Ronald Erickson, and investment banker Andrew Evans. Wayne Erickson previously developed relational databases for Boeing Computer Services and the University of Washington.

As was the style at the time–and now, for that matter–Erickson made an early push to market his database products as featuring "artificial intelligence." He told Knight-Ridder's Mary A.C. Fallon in 1984, "The AI market is really just starting; it might be 2001 before we get there," adding that AI would eventually replace the mouse and desktop icons as the common user interface for computers.

While then–as now–this AI talk was mostly industry hype, Microrim proved successful with its *R:BASE* product. In June 1986 the company released *R:BASE System V*, the version demonstrated in this episode. The most recent version, *R:BASE X.5* (or 10.5) came out in October 2018.

At some point in the 1990s–I couldn't nail down an exact date–Canada-based Abacus Software, Inc., acquired Microrim. In March 1998, Abacus announced plans to shut down Microrim as part of a consolidation. A few weeks later, in June 1998, a newly formed Pennsylvania company called R:BASE Technologies, Inc., acquired ownership of *R:BASE* from Abacus. A. Razzak Memon, a longtime *R:BASE* developer, was the principal behind R:Base Technologies. Memon, a surgeon by training, started working with *R:BASE* in the 1980s when he needed a database to assist in his AIDS research. Memon continues to run R:BASE Technologies as of early 2023.

Big Giant Donut Bringing Helix Into

Apple Silicon Era

Helix, the Macintosh database manager featured by Wendy Woods in this episode, is also still alive and kicking, making it one of the longest continuously developed Mac apps of all time. Indeed, *Helix* can trace its lineage back to the earliest days of the Macintosh, first coming out in 1984. *Double Helix*, the version featured on *Chronicles*, was a 1986 release with additional features.

Illinois-based Odesta Corporation was the original *Helix* developer. In 1992, Texas-based Albara Corporation acquired *Helix* from Odesta and continued to develop the database through its Northcon Technologies subsidiary, which adopted the name Helix Technologies. In 1998, a California-based company, The Chip Merchant (TCM), acquired Helix Technologies from Albara.

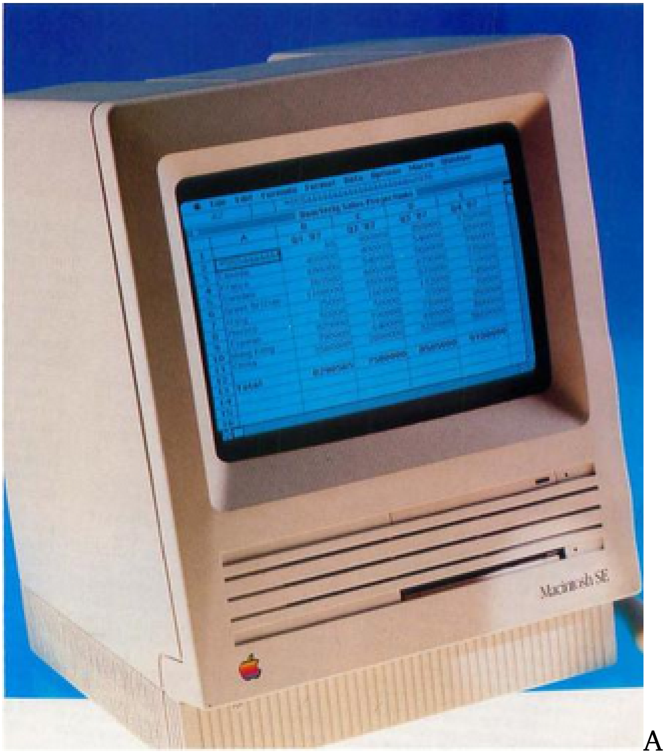
TCM filed for bankruptcy in April 2003. Several months earlier, TCM had turned over day-to-day operations of Helix Technologies to Matthew Strange and Gil Numeroff. They would eventually join with a third investor to create QSA Toolworks, LLC, which became the new developer of *Helix*. In September 2022, a New Mexico-based company, Big Giant Donut, Inc. (BGD), acquired *Helix* from QSA Toolworks. Dana Bernard, the principal behind BGD, was like R:BASE Technologies' A. Razzak Memon a longtime user of the database who decided to just buy the company outright. As of February 2023, BGD was in the process of re-writing the 32-bit *Helix* code into a 64-bit application capable of running on newer Apple Silicon Macs.

Notes from the Random Access File

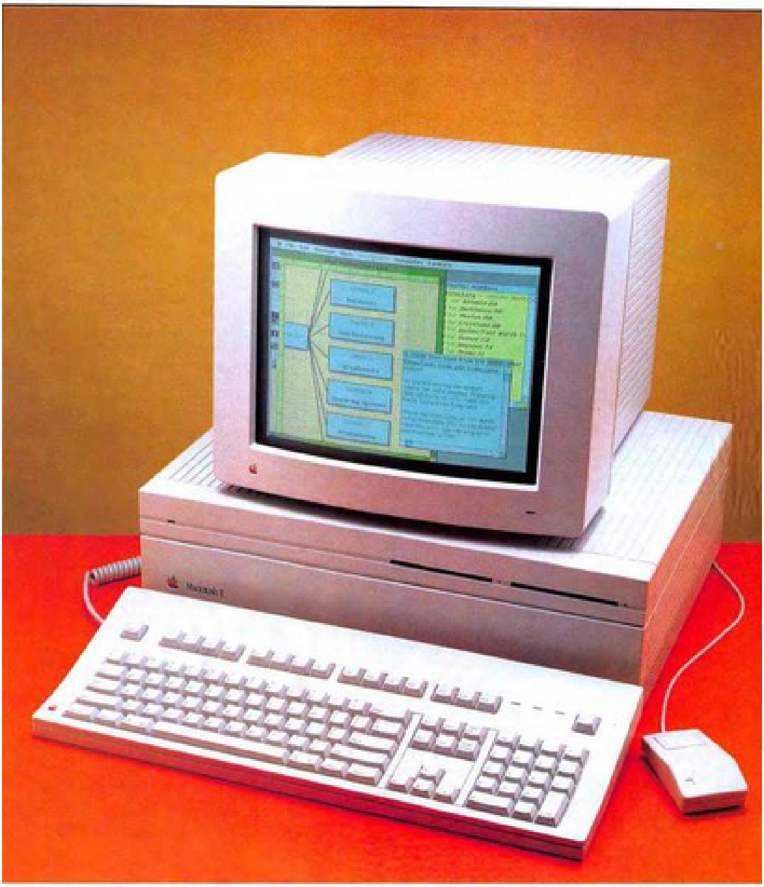
- This episode is available at the Internet Archive and has an original broadcast date of May 7, 1987.
- Thom Kozik left Ashton-Tate for Microsoft shortly after this episode first aired in 1987. He spent seven years of Microsoft before moving on to serve as president and chief operating officer of MindShare Media, an early internet

development company, from 1994 to 1998. Since then he's been an executive with a number of companies, including Yahoo, Atari, and Marriott. His most recent executive role is chief product officer with preEmptive Technologies Corporation, although based on the company's website it doesn't seem they have any actual products.

- Digital Research's decision to release *GEM Desktop Publisher* is interesting given that three ex-DRI employees left the company a couple years earlier to create *Ventura Publisher*, a desktop publishing application based on the GEM runtime. At the time, DRI wasn't interested in the product. I discuss this in greater detail in the debut episode of the *Chronicles Revisited Podcast*.



A publicity photo of the Macintosh SE. This image was taken from the April 1987 issue of “MacWorld”.



A publicity photo of the Macintosh II with an attached keyboard, mouse, and color CRT monitor. This image was taken from the April 1987 issue of “MacUser”.

Chapter 13: The Macintosh SE and the Macintosh II

When you think about it, the original Apple Macintosh was a ridiculous computer. It had a 9-inch monochrome display that was tiny even by 1984 standards. There were no expansion slots, which was a standard feature of most personal computers, including the venerable Apple IIe. And there was no way to add a hard drive without going to a third-party provider such as General Computer Corporation.

So by all rights, the Macintosh should have been a failure like Apple's two prior attempts to enter the business computing market–the Apple III and the Lisa–but it wasn't. This was largely thanks to the work of third-party hardware developers like GCC–but especially third-party software companies like Aldus and Adobe, which made the Macintosh the go-to in the newly emerging field of desktop publishing.

But by 1987, Apple realized the business market wasn't going to give up the comforts of expansion slots and color displays to live inside Steve Jobs' mystery box. In the wake of Jobs' departure, Apple CEO John Sculley and his team moved quickly to introduce a new, more business-friendly machine in the form of the Macintosh II while "rewarding" Mac loyalists with a rebuilt-from-scratch revision of the classic model, the Macintosh SE.

These two new Macs were the featured subject of this next *Computer Chronicles* episode from May 1987. Stewart Cheifet opened by showing Gary Kildall an add-on board for the new Macintoshes. Cheifet quipped that the Macintosh II actually looked an awful lot like an IBM PC/AT. And if you looked at the new IBM PS/2 computers, they resembled Macintoshes. Had the two computer giants finally come together and agreed on what a personal computer should be? Kildall replied they'd come together to try and compete for the same market. Apple learned from IBM's open architecture where third-party suppliers could offer expansion boards. At the same time, IBM learned from Apple that customers wanted a more user-friendly graphical interface and desktop publishing capabilities. So while the two companies hadn't come together on the same hardware, they had come together on the underlying philosophy.

Would Businesses Use Macs for More Than Desktop Publishing?

Wendy Woods presented her first remote segment, which focused on the use of the new Macs in business. Woods said the history of the Macintosh was similar to that of the personal computer industry–full of victory and defeat, of approval and rejection. Today, with Mac sales booming and two new machines joining the line, Apple seemed to be pushing harder than ever to make the Mac a major contender in the business world.

Mark Alan Winter, an industrial designer who owned the firm Cephalon, Inc., told Woods that the Macintosh marketplace had grown from the hobbyist computer users and hackers who were fascinated by the machine's potential to now seeing growth in the business world where that potential had been realized. The applications that had come out for the Macintosh had finally begun to approach what the machine was capable of. In contrast, when the original Macintosh was released in 1984, there were no serious business applications available, Winter noted.

Woods said that Winter's firm specialized in Macintosh graphics. It might not be on the Fortune 500 list yet, but it did have some big clients, and Winter said there was a growing acceptance of the Macintosh in corporate offices. He said that it was usually a company's design department or a "few unorthodox managers" who saw the world in their own way who brought Macintoshes into their offices. In the case of a design group, that made perfect sense.

Indeed, Woods said, the Mac's talent for desktop publishing got it through the corporate gates. But once inside, there were new obstacles to overcome. Winter said that in the past, a company's information systems department was a "central repository" and control point for the way information flowed in the company. Now you were proposing to bring in intelligent, independent workstations that could perform tasks independently of a central host computer–and which could communicate with one another independent of any centralized network. That had far-reaching implications for the traditional corporate power structure.

SE Made Concessions to User Demands for Expansion Slot, Hard Disk

Charlie Oppenheimer, the product manager for the Macintosh SE at Apple, joined Cheifet and Kildall in the studio to demonstrate the new machine. Kildall noted that when he bought his first Mac a few years back he found a couple of screws in the back that he couldn't open with a regular screwdriver. Why was the original Macintosh a closed architecture? Rather than just say "Steve Jobs," Oppenheimer offered a more diplomatic, if still condescending, reply. He said that back in 1984 Apple had a strong sense of what their customers were going to need, and there was no reason for most people to want to open up the machine, so it was set up to be "dealer serviceable" only.

So why the change in philosophy, Kildall asked. Oppenheimer said that both the SE and the Macintosh II represented a foundation on which developers could be more creative in adding expansion hardware and application software.

Turning to the SE on the desk, Oppenheimer explained some of the differences from the older Macintosh models. He noted that while the base unit still came with just one floppy disk drive there was an option to add either a second floppy drive or a hard disk inside the machine. This particular unit had the hard disk option. Oppenheimer turned the machine around to show the ports on the back, which were similar to those of the prior models. In addition, there were two Apple Desktop Bus (ADB) ports, which was Apple's new standard connectors for keyboards, mice, and other input peripherals. (The Apple IIgs, released the previous fall, was the first machine to feature ADB ports.)

Oppenheimer then pulled off the top case of the SE to show the internals. He pointed out that the SE only shared one hardware component with the previous models, and that was the CRT display. Everything else had been completely redesigned. He noted there was a more heavy-duty power supply that used 75 watts (as opposed to 50 on the previous models). There was also a fan–the bane of Steve Jobs' existence both before and after Flash–which was necessary to accommodate the hard disk. The hard drive itself was a 20 MB model using a SCSI connector. And there was a single accessory access port for mounting connectors for an expansion card.

Turning the open SE on its side, Oppenheimer next showed off the logic board, which he pulled out and showed Cheifet and Kildall. He said the board came with 1 MB of RAM standard, which could be expanded to 4 MB like the Macintosh Plus. The Motorola 68000 microprocessor was also the same as on the Plus and ran at the same speed. The system ROM had been expanded, however, from 128 KB to 256 KB.

Oppenheimer also pointed out a new gate array that incorporated 19 chips from the Plus, which he said was the key to performance improvements. He claimed the SE had a 15 to 20 percent improvement in overall processing speed, and SCSI performance was up to 2 times faster. Focusing on the expansion slot, he showed a General Computer card, a 68020 accelerator, which plugged on top of the motherboard.

Oppenheimer noted there were four types of expansion boards that Apple saw being available for the SE: accelerator cards, math co-processors, communications cards, and large screen adapters. Kildall asked how you could use multiple different cards given there was only one expansion slot. Oppenheimer acknowledged the issue and said the solution was for developers to create multi-function cards. He said the most popular option would likely be an accelerator card combined with a large-screen adapter.

Cheifet noted that even though the SE had an expansion slot, the manual cautioned users not to install a board themselves–they had to take their machine to a dealer. Oppenheimer said while it was easy for him to take apart the SE, as he just did it, it wasn't the sort of thing that the average user would be good at doing. So to insure the most reliable installation of the board, Apple felt it was best to have a dealer do it instead. (To be clear, all Oppeneimer did was remove the back of the case, pull out the motherboard, and *plug a card* into it.)

Kildall asked about the cost of the SE compared to a standard Macintosh. Oppenheimer said the Macintosh Plus still retailed for $2,199. The SE with two floppy drives would sell for $2,899, and with the hard drive option, $3,699.

Cheifet pointed out that many current Macintosh Plus owners were upset there was no way to upgrade their existing machines to an SE. What was Apple's reasoning behind that? Oppenheimer said that while Apple considered an upgrade path, in order to provide for an internal hard disk and expansion slot there was no way to do so via an upgrade. He reiterated his earlier point that every component of the hardware was different from the Plus except for the screen. So an upgrade would have been too laborious.

Looking Inside the Mac II's Open Architecture

Didier Diaz, the product manager for the Macintosh II at Apple, joined Cheifet, Kildall, and Oppenheimer for the next segment. Kildall opened by asking Diaz about the target market for the Mac II and how it differed from the SE. Diaz said that with its increased power, the Mac II was targeted at the higher end of the current marketplace, notably the business community. He also saw the Mac II penetrating new markets such as engineering and universities, in part because it could run UNIX as well as the native Macintosh operating system.

Kildall asked for a demonstration of the Mac II's "open architecture." Diaz had a Mac II unit in front of him. He explained you just had to pull two latches in the back to open the machine up. This made it possible for customers to add cards in the machine quite easily. (I guess you didn't need to take the Mac II to the dealer to do the upgrade for you?) He removed and showed off the Mac II's video card, which drove both monochrome and RGB color monitors. The video card had its own configuration ROM, which was part of the NuBus standard used in the Macintosh II. When the machine booted, it scanned all of the expansion slots for these ROMs, so the customer didn't have to manually configure any DIP switches. The video card also had a built-in lookup table with 16 million entries representing 16 million possible colors, although the Mac II could only display up to 256 of them at one time.

Continuing his disassembly, Diaz pulled out the chassis of the Mac II, which contained the hard disk and floppy disk drive mounted on a metal plate. He said the Mac II could be configured with a 20 MB, 40 MB, or 80 MB hard disk. The access time on the 40 and 80 MB drives was under 30 milliseconds, which could transfer up to 1.2 MB of data per second over the SCSI interface.

Diaz next showed off the 250-watt power supply and the logic board. He pulled out the motherboard and showed the Motorola 68020 microprocessor and an included co-processor. This was the next-generation revision of the 68000, the older processor being the one in the Macintosh Plus and SE models. The 68020 was a full 32-bit processor like the Intel 80386. Diaz claimed the 68020 offered a speed increase of up to 4 times over the Mac Plus. The math co-processor also came as a standard feature.

The Mac II had six expansion slots. Diaz said that a card plugged into any one of these slots could “take over” the entire machine. So for example, it would be possible in the future to plug in an expansion board with an updated CPU–say a hypothetical Motorola 68030–and it could run the computer. Diaz noted the Mac II also had the standard Macintosh ports, including the new ADB ports.

Cheifet asked for a software demonstration of the Macintosh II. Using a second machine setup at the desk, Diaz opened a *MacDraw* document and showed how the increased speed of the 68020 allowed for more fluid motion in manipulating the image. He noted the demo unit had a 13-inch color display. (Apple also sold a 12-inch monochrome display.) To demonstrate the impact of having a math co-processor, Diaz ran a simulation that had the Mac II graph a complex equation. First he had the machine draw the graph without using the math co-processor, then with it. As you probably guessed, the plotting went much faster with the co-processor–up to 200 times faster, Diaz claimed. He said this increased speed would allow Macintosh software to get into areas where it couldn’t before due to a lack of horsepower. Now it would be possible to do tasks such as 3D modeling.

Looking at the monitor, Diaz pointed out the display’s resolution was high enough to be used for both black and white and color. He brought up a digitized color image of an Apple executive. This demonstrated the "full power" of the Macintosh II's video card. He also brought up a computer-generated image to show off the computer's ray tracing capabilities.

Cheifet asked about the price for the Macintosh II. Diaz said the entry-level price was $3,895. The color display version with a 40 MB hard disk would run about $6,500.

Third Party Developers Excited by New Macs

Wendy Woods returned for her final remote segment, which began with some B-roll of an Apple factory in Fremont, California. Woods said that while users worried about the availability of software for the new Macs, the problem was magnified for the software developers who risked losing money if a machine wasn't successful.

Living Videotext was one of a few dozen companies that received prototypes of the SE and the Mac II, Woods said. The company immediately went to work upgrading its *MORE* idea processing program to utilize the Mac II's color abilities. (Paul Schindler reviewed *MORE* in an episode that I recently covered.) But unlike decisions made in the past, Living Videotext said the choice to support the new Macs was easy.

Dave Winer, president of Living Videotext, told Woods that you had to look at it from two angles. One was the economics: Did you think the machine would be successful in the marketplace? Did it answer the needs the users had? The second angle was more emotional. As a Macintosh user himself, Winer said the Mac II was virtually everything he wanted on his wish list. He was excited to put one of those machines on his desk. So it was therefore important for his company to support the new computers.

Woods noted the Macintosh SE could run virtually all current Macintosh software. So there was no shortage of readily available programs. And developers saw the Macintosh II's expandability as its ticket to success–an open road for other companies to develop add-on products and new software.

The End of the Steve Jobs Era?

For the final segment, Cheifet and Kildall held a round-table discussion with regular contributors Jan Lewis and George Morrow. Kildall asked Lewis which of the new Macs consumers should buy. Lewis said that if price was no issue, everybody would get the Macintosh II. But most users had to ask themselves what they wanted out of their system, and how long they wanted that system to last. Right now, the Macintosh SE was a very big seller. People who had been buying the Macintosh Plus were now buying the SE. And for something like doing desktop publishing right now, the SE was the better bet. But if you wanted expandability, the Macintosh II would give you many, many years of enjoyment.

Cheifet asked Morrow for his thoughts on the new Macs. Morrow thought the Mac II was an expression of market envy. Apple had seen IBM do well with the business market and the add-on manufacturers. Now Apple wanted a piece of that action. So they came up with a new bus and color capabilities. It was like a fantastic game of "musical chairs," where everybody was moving over to the position of what everyone else was doing a year ago.

Cheifet asked Lewis about Apple's efforts to cut into IBM's lead in the business market. Was it going to work? Lewis said it was already working with respect to desktop publishing. Even though corporate executives said the Macintosh wasn't on their list of approved computers, when you walked up and down the halls of their offices there were Macs present. So Apple already had a "wedge" into the corporate market, and the new machines would take them much further. Morrow added that Apple had also done an awfully good job at computer networking.

Kildall asked Morrow how the Intel 80386 stacked up against the Macintosh's Motorola 68020 in terms of performance. Morrow said the two were very similar in terms of raw processing power.

But based on early reports from actual users, there seemed to be a “lot more overhead” in the Macintosh II than there was in the current 386-based machines. So the effective speed of the 68020 was somewhat lower. But both processors had a lot of horsepower. And the engineering workstation market would now be an awfully exciting place for a machine like the Mac II.

In our “premature celebration” moment of the episode, Cheifet asked Lewis if the new open architecture approach to the Mac marked the “end of the Steve Jobs era for good.” Lewis said it was definitely the end of that era. On the other hand, the one problem Apple would have as a result of being more open was that there were now likely going to be Mac clones. In the long run, however, she thought Apple would still come out ahead.

U.S., Dutch Government Agencies Deal with Computer Problems

Cynthia Steele presented this week’s “Random Access,” which was recorded in September 1987.

- West German computer hackers tapped into NASA’s secret files. Steele said the attackers gained access to information on the Space Shuttle *Challenger* and managed to change data on at least 20 of the agency’s computers.
- RICOH announced a new combination photocopier and scanner that was the size of a book. Steele said the copier also featured a digital attachment that could store scanned images.
- The United States Army had a new Automated Intelligence Maintenance (AIM) system that helped it to repair helicopters, fixed-wing aircraft, and other equipment. Steele said that AIM was an “expert system” that asked Army mechanics yes-or-no questions, with the answers helping to diagnose problems. AIM only had a built-in vocabulary of 12 words for input, but an unlimited output vocabulary.
- Paul Schindler reviewed *Dark Castle* (Silicon Beach Software, $50), an action-adventure game for the

Macintosh.
- Computer-related words made up the bulk of the new words in the most recent edition of the *Random House Dictionary*. Steele said the next largest category of new words related to food and cooking.
- Gallaudet University in Washington, DC, planned to launch a program that would use computers to teach written English to the school's deaf students.
- The U.S. Department of Commerce's Bureau of Standards had a new computer system called Hazard1, which was used to assess and analyze house fires to help better prepare firefighters.
- A law enforcement agency in the Netherlands stopped using software to identify "most wanted" criminal suspects after it targeted innocent citizens instead.

SE Boosts Apple Revenues While Press Is Dazzled by Mac II's Potential

Apple formally announced the Macintosh II and Macintosh SE at the Universal Studios Ampitheatre in Los Angeles on March 2, 1987. The less-expensive SE was, not surprisingly, the bigger attraction for consumers. In late April, Apple CEO John Sculley told the press that the initial orders for the SE were the "strongest for any new Macintosh product in Apple's history."

Indeed, by July 1987, Apple reported the SE now accounted for nearly half of the company's third-quarter revenues and that profits were up 65 percent from the previous year. The Macintosh II, which formally shipped on May 1, was not as big of a seller, although it did help Apple with large corporate sales. For example, in October, news reports said Apple sold between 6,000 and 8,000 Macintoshes to General Motors–many of them Mac IIs–for use in the company's front offices.

From a historical standpoint, the release of the SE and the Macintosh II marked the beginning of Apple differentiating its Mac line between high-end, expandable professional workstations and medium-range all-in-one machines. This market segmentation persists to the present day. The Macintosh II can be seen as an early forerunner of the Mac Pro, while the SE's legacy lives on in with the iMac.

And like today's Mac Pro, the Macintosh II was really a niche machine. Reviewers at the time took note of this. Richard O'Reilly and Lawrence Magid said in their review for the *San Francisco Examiner* that while the Mac II was "an exciting and powerful machine" it was "rather expensive for most business and personal applications." Still, the "extra speed, expansion capability and state-of-the art design should keep this machine viable well into the next decade."

The Apple press was understandably elated with the new Macs. Michael D. Wesley, writing for the April 1987 issue of *MacUser*, was particularly awed by the potential memory capacity of the Macintosh II:

> Macintosh II comes with 1 megabyte of RAM in SIMMs, just like the Mac Plus. There is room on the motherboard for 8 megabytes using 1-megabit chips. But Apple, anticipating continued rapid developments in chip technology, made the machine capable of addressing up to 128 megabytes of RAM on the motherboard (using 16-megabit chips, which may be available in the 1990s). And it's possible to build the RAM up to 2 gigabytes by filling the slots with RAM cards.
>
> Those numbers are so staggering that they made me break out laughing when I first read the specs. What could anyone possibly do with 2 gigabytes of RAM? Nobody knows yet because the option has never existed, but it makes the imagination run wild with possibilities.

As I understand it, the Macintosh operating system at the time could not handle more than 128 MB of RAM. But it was theoretically possible to address up to 2 GB–although other sources said it was 4 GB–of RAM using UNIX, which was a fully 32-bit operating system.

And to clarify another point that Didier Diaz made during his demonstration, while the Macintosh II did have a video card capable of displaying 256 colors at once out of a total available palette of around 16.8 million, that was not the standard graphics option for the machine. The basic video card only had 256 KB of RAM and supported just 16 colors (or shades of gray) at one time.

Notes from the Random Access File

- This episode is available at the Internet Archive and has an original broadcast date of May 26, 1987. The "Random Access" segment was likely recorded in September 1987.
- Charlie Oppenheimer remained at Apple until 1993. He went on to serve as CEO of three tech startups that he later sold: Aptivia (renamed Vivamart), Digital Fountain, and Loggly. As of 2023, he's working as a consultant and corporate adviser.
- Didier Diaz remained at Apple until 1997. His last reported executive position was in 2009 with Access Europe GmbH, an in-car infotainment software company.
- Mark Winter's design company Cephalon was only in business for a few years. Among his company's credited inventions was the "BodyFender," which a newspaper article described as a "large magnetized rubber shield that you can sleep on the side of your car and peel off whenever you want."
- Silicon Beach Software, the company behind the game *Dark Castle*, was actually more notable for its contributions to lower-end paint and graphics applications, such as *SuperPaint* and *Digital Darkroom*. Aldus Corporation, the parent company of *PageMaker*, purchased Silicon Beach in 1990 in an all-stock transaction. Aldus, of course, was later sold to Adobe Corporation.
- According to an Associated Press report, the West German "hackers" who accessed NASA's computers were teenagers who "had no interest in the secret data." Indeed, when they "realized the enormity of their discovery," they turned to a local computer club in Hamburg for advice on

what to do next. NASA claimed there was no classified information on the compromised machines.

Chapter 14: COMPUTEX Taipei 1987 and Hsinchu Science Park

We close out the fourth season of *Computer Chronicles* with a visit to Taiwan. This July 1987 episode focused on the growing influence of Asia-based PC clone manufacturers in the U.S. market. In a brief studio introduction, Stewart Cheifet showed Gary Kildall one such clone from the Taiwanese company Multitech. Cheifet noted that the computer, monitor, and disk drive were all made in Taiwan. Indeed, Taiwan was the world's leading manufacturer of computer monitors and disk drives.

Cheifet added that Taiwan and South Korea were also leading producers of IBM clones, and in fact taking quite a bit of market share away from Big Blue and other U.S.-based manufacturers. Was this a threat to America's leadership role in computer technology? Kildall quipped that a used IBM PC-AT was now available for $995 while a comparable Asian clone was just $695.

More to the point, Kildall said he didn't see a real threat to American leadership. Asia's growing market share was about the technology of manufacturing rather than the technology of computing. The United States would always have a large group of people interested in sales and service, reliability, state-of-the art computing, et cetera, and they would continue to buy the more expensive machines. The Asian clones acted as good "filler" machines to perform tasks like word processing. But he didn't actually see the Asian machines actually catching up to the American PCs in terms of technology.

Taiwan's "Reverse Brain Drain"

There were no additional studio segments in this episode. Instead, Stewart Cheifet narrated an extended travelogue segment recorded in Taiwan in June 1987. The first segment focused on Hsinchu Science City, located just outside the capital city of Taipei. Cheifet opened by noting that the Republic of China's 19 million residents currently enjoyed one of the highest standards of living in Asia.

John C.I. Ni, director general of Taiwan's Industrial Development & Investment Center (IDIC), told Cheifet that the country's economic growth was based on its fast, expert-oriented industry. Cheifet noted that a large proportion of those exports fell into the electronics category, although most American buyers wouldn't recognize the local brand names. From electric fans to refrigerators to computers, Taiwan turned out products for such companies as Amana, GTE, ITT, and IBM. The Taiwanese companies had a special relationship with their American counterparts known as "original equipment manufacturing" (OEM).

Cheifet said the OEM connection was clearly evident at the recent COMPUTEX Taipei show, which was held from June 8 to 14, 1987. COMPUTEX was one of the first computer trade shows to be held in Taipei's World Trade Center, and it featured dozens of small booths with intriguing products and names. Some, like Tatung, were well known in its home market, with sales in the hundreds of millions of dollars. But many booths featured less-famous manufacturers like Kingtech, Halikan, and Oemtek–making it clear from the start that buyers were free to choose any name they liked.

Even larger Taiwanese companies like Mitac and Microtek International were satisfied with the "behind the scenes" approach to marketing their products, Cheifet said. Bobo Wang, co-founder and president of Microtek, told Cheifet that his company's brand wasn't well known like Hewlett-Packard, and it would take several years to set up a distribution channel and develop brand recognition in the United States. So Microtek's strategy was to work with a reputable American company and serve as its OEM. Microtek's profits were lower with this approach, Wang conceded, but their products ultimately served more people.

Until recently, Cheifet said, Taiwanese exports were associated with cheap, mass-produced goods and an abundant supply of labor. But that image had changed. Vincent C. Siew, director general of Taiwan's Board of Foreign Trade, said the country's standard and cost of living had grown rapidly in the past few years. This meant higher wages for labor. The economy therefore no longer had to depend as heavily on traditional labor-intensive industry.

Cheifet added that the increasing wages of Taiwan's factory workers did not seem to concern the local computer companies, who saw their cost advantage as engineering rather than manufacturing. Stan Shih, president of Multitech Industrial Corporation, told Cheifet that in the computer industry the labor and assembly represented less than 2 percent of the a machine's total costs. The more significant costs were for research and development, marketing, product support, and overhead. Another company president, C.S. Ho of Mitac International, added that the compared to the United States, the cost of Taiwanese computer brands were still much cheaper.

In terms of technical education, Taiwan's schools graduated as many engineers on a per-capita basis as Japan, Cheifet noted, which was a much higher proportion than in the United States. This influx of engineering graduates propelled Taiwan's computer industry from a source of cheap clones to an original contender. Mitac's Ho said that Taiwan had the technical capability to develop high-end PCs.

Cheifet said that at the recent COMPUTEX, there were still plenty of the peripherals and computer components that initially made Taiwan a major exporter. But the show also featured some distinctly new products as well from the leading local companies. Tatung, one of the country's biggest companies, was the world's largest producer of computer monitors. And one of its biggest clients happened to be the biggest computer company in the world–IBM. Tatung also operated its own college, the Tatung Technical Institute, which started out as a vocational school but now offered advanced degrees in everything from computer science to management.

Tatung president W.S. Lin told Cheifet that a reputation for quality exports was critical to Taiwan. He noted that Taiwan's situation was similar to that of Japan after World War II. Initially, Japan's postwar exports were also considered poor and unreliable. But like Japan, Taiwan had now developed a central quality authority to certify exports.

Among Taiwan's top exporters, Cheifet said, was Multitech. Started in 1976 with $25,000 in capital, Multitech now employed 2,700 people and expected to sell $350 million in computers in 1987. Cheifet claimed that Multitech founder Stan Shih had been called the "Steve Jobs of Taiwan." Wang said he didn't agree with that characterization given that Taiwan's computer industry was still relatively small and the country lacked a mature capital market. So Multitech was in a completely different–and more difficult–position than Apple.

Cheifet said that Multitech was a major exporter to the Untied States and manufactured PCs for Texas Instruments, and also made computers under the Franklin label for Sears. (Ironically, Franklin used to make Apple II clones until they got sued into bankruptcy.) Multitech was now just beginning to sell to the American market under its own Acer brand, but Shih believed it would still be sometime before Taiwanese brand names became common abroad.

Shih said there were two major problems selling Taiwanese-branded PCs in the United States. The first was image. Multitech had to establish itself as a quality product, which would take time. The second was scale. Multitech still wasn't big enough to fully support the U.S. market.

Cheifet added that Multitech was located in Science Park, which was a government-sponsored hi-tech industrial community that was part-Silicon Valley, part-free trade zone, and part-university campus. Some of Taiwan's other computer leaders were also in Science Park, including Mitac and Microtek. In particular, Microtek was an unusual example of a "reverse brain drain."

While most of Taiwan's overseas-educated students tended to remain abroad, Microtek's Bobo Wong actually quit his job in the United States to look for new opportunities back home. Wang said he and his co-founders were working for Xerox in Los Angeles doing product design. Then they reached a sort-of mid-life crisis and decided they should do something on their own.

Microtek's principal product was a desktop scanner, Cheifet noted, which was sold in the United States under the AST Research label. In fact, Microtek was now the world's leading manufacturer of scanners, with about 69 percent of the market. Wang told Cheifet that he was skeptical of traditional offshore manufacturing, at least when it came to PC products. He said the evolution of technology was much faster than with other products. The product life cycles tended to get shorter and shorter. That meant there was a tremendous need for developing new product. And that didn't leave much time to move the manufacturing offshore. So the new trend was to have manufacturing and research and development more closely tied together.

Cheifet said that like most companies in Taiwan, Multitech and Microtek both started small, and they continued to see small size as a distinct advantage, at least in the computer business. Wang said that Taiwan was not used to big corporations. The economy's structure worked against that. So most of the companies were much smaller in scale, with between 100 and 500 employees, that could move much faster.

Another small, independent manufacturer was the K.S. Brotherbox Company. Cheifet said it marketed products under the Kingtech label and was an example of the small exporter. Kingtech didn't have a hi-tech plant in Science Park. Rather, its factory, offices, and even living quarters for some of the employees were in a single building in downtown Taipei. Kingtech's assembly line turned out PC/XT and PC-AT compatibles, as well as a new portable 286 machine with an LCD screen. Wilma Wang, Kingtech's export manager, told Cheifet the company exported to the United States, Canada, South Africa, Switzerland, Holland, England, Australia, and Italy.

Taiwan had less than half the population of South Korea, Cheifet noted, yet Taiwan had twice as many small electronics companies–over 65,000. And almost 3,000 of them made computers. That might seem like a challenge to the foreign buyer but it was also an advantage. John Mesenbring, a vice president with International Instrumentation Inc., told Cheifet that the larger Korean companies like Hyundai and Samsung already had well-established distribution channels in the United States. So when you wanted to buy from those companies you went through a U.S. sales representative. But in Taiwan, many of the companies were American financed and owned, and many of them were just small shops. So economically speaking, you didn't have the same monopoly situations that you saw with South Korea.

Jack Tramiel's Cheapness Won Out Over His Patriotism

In a brief American interlude, Wendy Woods presented a report from the Sunnyvale, California, offices of Jack Tramiel's Atari Corporation. Woods said that with the exception of its monitors, every product that Atari made–from game machines to the ST computers and laser printers–were manufactured in Taiwan. Atari's U.S. facility was just a "big think tank" where the products were designed. It was cheaper this way, Woods said. Labor was cheaper overseas, and Atari made no bones about its interest in cutting costs.

Neil Harris, Atari's director of communications, told Woods that it was possible to do manufacturing in such a way that was not too labor-intensive now. But if you didn't have a very automated factory, it made sense to do your manufacturing overseas.

But Woods added that engineers had some trouble with this arrangement. Communication was a problem when you and your factory didn't share the same language. There was also the issue of shipping time. It took up to three weeks for product to reach the U.S. from Taiwan. Another disadvantage was that Atari's current Taiwan plant was already working at full capacity and the company wanted to further expand its manufacturing capability. So armed with millions of dollars from its recent public stock offering, Atari was looking into establish a manufacturing plant in North America.

Atari's Harris said the bottom line was that the consumer didn't care if a product was made in the United States, Taiwan, or on Mars. The customer was looking for a price and a value that Atari had to provide. And at this point, Atari thought it could provide that price and value with domestically manufactured products.

The Future Looked Bright for Taiwan's Tech Industry

Returning to Taiwan, Stewart Cheifet said that the country's success as "PC vendor to the world" was giving way to a new eagerness to become an innovator as well. The Republic of China's government was providing some support for this. The Science Park project was an attempt to merge some of the entrepreneurial features of Silicon Valley with the investment appeal of a free-trade export zone. The 1,000-acre park had around 80 companies installed or waiting to move in–just a hint of what was planned for the future.

Choh H. Li, the director general of Science Park, told Cheifet that the total output for 1987 was expected to be around $700 million. In 10 years, he expected it would be $7 billion. Today, the area around Science Park had a population of 400,000. In 10 years it would be around one million people.

Cheifet said that before Science Park, venture capital in Taiwan usually came in the form of a government grant. Today, Science Park had five private venture capital firms, along with banks and two universities on the outskirts. But Science Park still had a long way to go. Li said that in addition to the area's physical environment there was a good professional services industry. Taiwan as a whole was "way behind" in this area, however.

At Mitac, Multitech, and Microtek, Cheifet said the search for new products was central to each company's plans for the future. Microtek, the market leader in desktop scanners, was exploring the links between that technology, laser printers, and optical disks. Microtek's Bobo Wong said that a CD-ROM could potentially store about 10,000 regular-sized documents in an image format. A scanner would be a necessary input device to create those images.

Meanwhile at Mitac, best known in the U.S. for producing floppy disk drives, Cheifet said the emphasis was also on desktop publishing on the software side. While looking to a solution for the problem of the memory-hungry Chinese alphabet, Mitac discovered a way to reduce the memory required to story any type of character. Mitac president C.S. Ho explained that his company was developing a "universal engine" that could display Chinese, English, or Japanese characters at high speed and using less memory.

Chiefet said that almost everyone in the PC business was wondering how IBM's new PS/2 architecture would affect clone sales, and Taiwanese companies were no exception. While some companies were trying to reverse engineer the PS/2, others were contemplating a different course of action. Multitech's Stan Shih said his company was looking to join an outside group of clonemakers who wouldn't follow the new PS/2 standard. He noted that group represented more than 60 to 70 percent of the market.

Cheifet said that Taiwan's official agency for hi-tech research, the Industrial Technology Research Institute (ITRI), was originally designed to perform the basic research and development that many smaller Taiwanese firms could not afford. ITRI president Morris Chang told Cheifet the government initially provided 100 percent of the agency's funding. But as time progressed, the industry began to find ITRI's resources to be very attractive to them.

ITRI's electronics research arm was known as ERSO, Cheifet said, and had both short- and long-term research programs. For Taiwan's chip industry, ERSO designed application-specific integrated circuits (ASICs). Indeed, Taiwan was the world's leading supplier of specialized chips for consumer products like toys, telephones, and watches.

Cheifet said that ERSO's work on the Intel 80386 microprocessor gave Taiwan's PC makers the jump on some of their American competitors. Multitech had a low-priced 386 PC on sale just a few weeks after Compaq's initial introduction. ITRI's Chang said he wasn't looking for any dramatic breakthroughs. What ITRI was trying to do was focus on the solid, but mundane, work that was necessary to build the foundation for upgrading Taiwan's industry one step at a time.

But there were some cutting-edge products at ERSO, Cheifet noted, and they were beginning to bear fruit, such as Chinese-language voice recognition and speech synthesis. Since Chinese is a tonal language, paper dictionaries were only imperfect guides to pronunciation. To overcome this shortcoming, ERSO developed a CD-ROM dictionary complete with sound and graphics. It could be played on any compact disc player through a black box called a Multifunction CD-ROM Controller. The controller, initially meant for school and libraries, would sell for about $3,000.

Cheifet said that for Taiwan's new generation of entrepreneurs, the future looked bright. Some of the country's biggest export clients were beginning to talk about tariffs and protectionism, but trade problems hadn't affected sales figures yet. Multitech's PC sales were up 100 percent, and the company had a long-term strategy based on the ancient Chinese game of Go. Multitech's Stan Shih explained that Go was a game that relied on using different types of strategy. Similar to the computer industry, you needed to build a solid base that allowed you to take risks later.

In closing, Cheifet said that the quiet success of Taiwanese computers overseas was a sign of the industry's maturity and the key ingredients of that success were not difficult to uncover. Stan Shih told Cheifet that to win in the computer business, the real long-term weapon was human resources–and Taiwan had lots of that.

Analyst Insisted IBM Would “Conquer the Clones”

Cynthia Steele presented this week’s “Random Access,” which was likely recorded sometime in late July 1987.

- Some recent computer press reports said that 40 percent of the IBM PS/2 Model 50 computers delivered were “dead on arrival.” IBM admitted there was a problem, but it could be easily corrected by using the reference disk included with each system.
- Computer industry analyst Stewart Alsop predicted IBM would unveil a new marketing strategy that would “conquer the clones” and stay ahead of the Macintosh. More precisely, Alsop predicted IBM would develop separate computer solutions for specific businesses, with the goal of totally hiding the operating system from the user. Alsop said this would allow IBM to increase its sales by 50 percent over the next three years.
- Sharp announced the release of a new magneto-optical disc drive that could erase and rewrite onto 5.25-inch optical discs. Steele noted each disc could hold 422 MB of data.
- Digital Equipment Corporation said it would start manufacturing its MicroVAX II minicomputer in India. Steele said DEC also planned to use Indian engineers to develop software for the international market.
- A new program called *President Elect 1988 Edition* from Strategic Simulations allowed you to play as 1 of 67 real political candidates running for president. Steele noted that players could use the program to predict whether Democratic frontrunner Gary Hart would actually win next year’s real presidential election. (Spoiler: He didn’t.)

Children of Hsinchu Science Park Are Now All Grown Up

Among the many Taiwan companies discussed in this episode, the most recognizable today is probably Acer. According to a

January 2023 report from Gartner, a tech analyst firm, Acer is the sixth-biggest personal computer vendor in the world, with a market share of about 6.7 percent. It actually ranks just behind another Taiwan-based company, ASUS, which was founded by four ex-Acer hardware engineers in 1989. (The largest PC manufacturer in the world, Lenovo, is based in mainland China.)

Stan Shih founded Multitech in 1976 with his wife, Carolyn Yeh, and three other partners. Shih earned his bachelor's and master's degrees in electrical engineering from Taiwan's National Chiao Tung University. Before starting Multitech he worked for Unitron Industrial Corporation, where he designed desktop calculators, and then for Qualitron Industrial Corporation, which developed the world's first pen watch. Multitech itself started out as a training and consulting business before expanding into manufacturing in 1981.

Shih served as Multitech's chairman from its founding in 1976 until later in 1987, when the company was formally renamed Acer. Shih continued as Acer's chairman and CEO until his retirement in 2004. He briefly returned as chairman from November 2013 to June 2014 to oversee a leadership transition.

Another company that is still around and well-known today is Microtek, which continues to dominate the scanner and digital imaging market. Microtek was one of the earliest successes of the Hsinchu Science Park project. Bobo Wang told the *New York Times* in 1982 that he returned to his native Taiwan due to the promise of $1 million in startup funds from Hsinchu Science Park. That wasn't a lot by Silicon Valley standards, he noted, but it was enough to hire 75 employees–50 of them research and development engineers–which would not have been possible on a similar budget in the United States.

Wang earned his electrical engineering degree from National Taiwan University in 1969. After completing mandatory military service, Wang relocated to the United States in 1971 and earned a master's degree at UCLA. He then spent the next eight years working for Xerox in the Los Angeles area. He started out as a testing engineer on mainframes before moving on to work with microprocessors. As Wang told Stewart Cheifet, he had a mid-life crisis of sorts when he turned 35 and decided to return home to Taiwan, where he co-founded Microtek with four other ex-Xerox colleagues. Curiously, I haven't been able to find out anything about Wang's activities since around 1990.

A third company that is still involved in tech today is MiTAC. Like Microtek, MiTAC International was founded in Hsinchu Science Park in 1982. MiTAC was apersonal computer design and manufacturing business from the outset. The company started exporting its computers to overseas markets in 1985, and by 1990 was the top PC brand in a number of European countries, including the United Kingdom and France. MiTAC went public on the Taiwan Stock Exchange in 1990 and opened its first factory in mainland China in 1993.

In the 21st century, MiTAC shifted away from personal computers to consumer electronics and Internet-enabled devices, such as GPS systems and dashboard cameras. The company took on its present name of MiTAC Holdings Corporation in 2013 and moved into a new headquarters in Taoyuan, a city in northeastern Taiwan, in 2017.

Notes from the Random Access File

- This episode is available at the Internet Archive. The exact airdate is unknown but the program likely first aired sometime in July 1987.
- Vincent C. Siew had a long career at Taiwan's Board of Foreign Trade, joining the agency in 1972 as an inspector and becoming director general in 1982. IHe joined the Executive Yuan, Taiwan's cabinet, in 1990 and served as president (premier) from 1997 to 2000. In 2008, Siew was elected Taiwan's vice president, serving a four-year term under President Ma Ying-jeou. Siew declined to run for a second term in 2012.
- Morris Chang served as ITRI's chairman from 1985 to 1994. Born in mainland China in 1931, he moved to the United States in 1949 and went on to earn his bachelor's and master's degrees at MIT, and later a doctorate from Stanford. Chang went on to a 25-year career at Texas

Instruments, eventually becoming manager of the company's semiconductor business. He eventually left TI and spent a year at General Instrument before taking his post at ITRI in Taiwan. Not long after this episode aired, Chang founded Taiwan Semiconductor Manufacturing Company (TSMC), where he also served as CEO from 1987 to 2005 and again from 2009 to 2018.

- Neil Harris began his career in tech working for a small, Commodore-owned computer store in Philadelphia before later joining the company as part of the product team that launched the VIC-20. Harris also oversaw Commodore's in-house publications before joining his former boss, Jack Tramiel, at Atari Corporation. After leaving Atari he spent a number of years in game development. Since 2016, Harris has served as an elected member of the City Council in Gaithersburg, Maryland. Kay Savetz of *ANTIC The Atari 8-bit Podcast* interviewed Harris extensively about his career in 2016.
- Tatung can trace its history back to the 1918 founding of a construction company in Taipei by Shan-Chih Lin. In 1942, Lin sold his construction business and used most of the proceeds to establish a trust to promote industry and vocational training throughout Taiwan. This trust funded the creation of Tatung, which Lin also ran. The new company initially made its mark selling electrical appliances before moving into televisions and telecommunications products. By the time of Lin's death in 1972, Tatung was the largest non-government-owned company in Taiwan. Wei-shan Lin, who spoke to Stewart Cheifet, is the grandson of Shan-Chih Lin. W.S. Lin became president of Tatung following his grandfather's death and his father's elevation to chairman. W.S. Lin was forced out of the company in 2018 following an embezzlement scandal that saw him sentenced to eight years in prison. In October 2020, a "market faction" of shareholders managed to secure a majority of Tatung's board of directors, effectively ending the Lin family's control of the company.
- Multitech/Acer's Stan Shih wasn't kidding around about the importance of the game "Go" to his company. In 1988, Acer held a multi-stage tournament where contestants

played against a computer Go program. The human finalists then competed for a $1.26 million prize.

- Speaking of Go, the game was also the inspiration for the name of Jack Tramiel's Atari Corporation. "Atari" refers to a specific move in the game. While I doubt Tramiel was much of a Go player, the name actually came from the co-founders of the original Atari, Inc., Nolan Bushnell and Ted Dabney, who used to play the game while sharing an office in the late 1960s.
- *President Elect 1988 Edition* was the follow-up to a 1981 program created by Nelson G. Hernandez Sr. Hernandez recalled to Charles Bethea in a 2015 *New Yorker* retrospective that while the 1981 game was "quite primitive," it led to a job offer from Electronic Arts' Trip Hawkins, which Hernandez had to decline due to a military service commitment.

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